Telephony

THE AMERICAN TELEPHONE JOURNAL

PUBLISHED EVERY SATURDAY BY THE TELEPHONY PUBLISHING COMPANY
VOL. 71 No. 26.

CHICAGO, DECEMBER 23, 1916.

SINGLE COPIES, 10 CENTS
YEARLY, U. S. A., $3; CANADA, $4
ALL OTHER COUNTRIES, $5

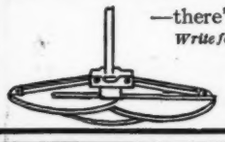
DEC 23 1916
UNIV. OF MICH. Library
Engineering Library

H. G. WEBSTER
CONSULTING ENGINEER
MONADNOCK BLOCK
CHICAGO

Telephone Engineering.
Automobile Accessories.
Electric Signaling.
Patent Investigations.
Expert Testimony.

You will
go around in a circle if you are looking for a better anchor than the

EVERSTICK



—there's a reason.
Write for literature.
EVERSTICK Anchor Co.
St. Louis, Mo.

Edward E. Clement
Attorney at Law & Electrical Engineer

PATENTS

Soliciting, Consultation, Reports, Opinions

Office: McLachlen Building
700 Tenth Street, Washington, D. C.

Telephone Cables
ALL SIZES AND CAPACITIES

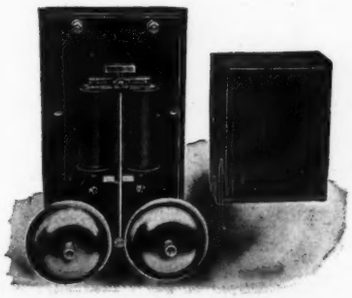
Hard Drawn Copper Telephone Wire.
Galvanized Iron Telephone Wire.
Siemens-Martin and High Strength Strands.

AMERICAN ELECTRICAL WORKS
PHILLIPSDALE, R. I.
CHICAGO—112 W. Adams St.
CINCINNATI—Traction Bldg.
NEW YORK—165 Broadway

Order it from our Nearest Branch

Automatic Electric Co.

Chicago, Ill., U. S. A.
Makers of 600,000 Automatic Telephones
We Have Branches in
New York—46 W. Broadway.
Buffalo—332 Ellicott St.
Toledo—Second Nat. BankBldg.
Boston, Mass.—Tremont Bldg.
Pittsburgh—First Nat. Bk. Bldg.
Detroit, Mich.—Ford Bldg.
Philadelphia, Pa.—Bourse Bldg.
St. Louis, Mo.—Syndicate Trust Bldg.



You can use this Bell either as a

Magneto Extension Bell
C. E. Extension Bell
or Desk Set Ringer

It is equipped with standard striker movement and 2½-inch gongs.

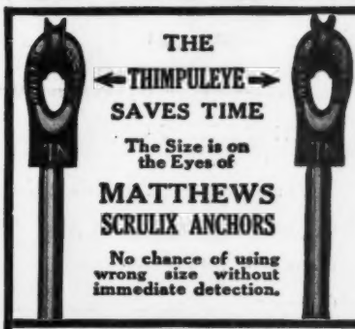
IT WILL ALWAYS GIVE A LOUD CLEAR SIGNAL

The Holtzer-Cabot Electric Co.
Boston, Mass., and Chicago, Ill.

American Steel & Wire Co.'s
W. & M. TELEPHONE WIRE
AMERICAN STEEL & WIRE CO.
Chicago New York Cleveland
Worcester Pittsburgh Denver

CEDAR POLES
Wire or write for delivered prices
NATIONAL POLE CO.
ESCANABA :: :: MICH.

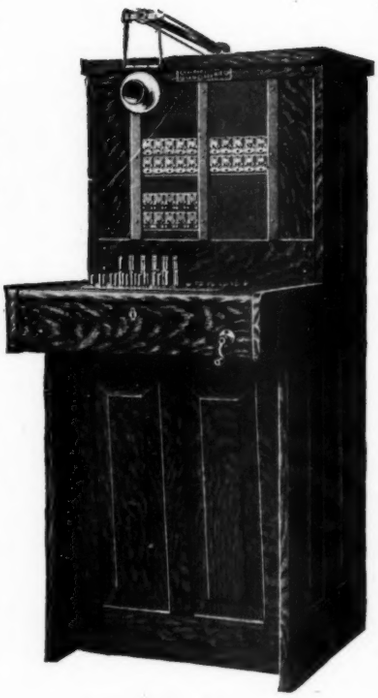
FORT WAYNE PRINTING COMPANY
FORT WAYNE, IND.
Printers and Blank Book Manufacturers
Write for Samples and Prices on I. C. C. Forms
Ours Are the Best



THE THIMPULEYE SAVES TIME
The Size is on the Eyes of
MATTHEWS SCRULIX ANCHORS
No chance of using wrong size without immediate detection.
W. N. MATTHEWS & BRO., Inc.
St. Louis, Mo.

SWITCHBOARDS

When in the market, investigate the best. LEICH BOARDS embody more improvements, require less attention and give you greater value than any other. WE INVITE INVESTIGATION.



CODE No. 4-A-50
SWITCHBOARD

Be Sure of Your Drop—the most vital part of your board.

WHAT YOU WANT IS:

A FIXED POLE PIECE AND PERMANENT ARMATURE ADJUSTMENT, insuring the highest efficiency and greatest sensitiveness regardless of any variations in the length of the spool core.

A REMOVABLE COIL AND SHELL, permitting examination of jack springs without removing drop strip from the board.

A DROP that will give a positive audible signal, making it possible to readily distinguish code rings.

A JACK WITH SPRINGS MOUNTED VERTICALLY, which prevents accumulation of dust.

A NIGHT ALARM that can be examined, adjusted or removed from the front of the board without removing the drop frame or coil.

A JACK FERRULE that can be removed from the front of the board.

Compare this drop with a drop having the armature pull directly against the spool core, where a few thousandths of an inch difference in the length or fit of the coil in the shell will make a big difference in sensitiveness and efficiency.

We wish to particularly call your attention to our Multiple Magneto Switchboards equipped with electrically restored drops.

Mail coupon today. Our Specifications and Prices will interest you.

Sole Manufacturers of North Magneto and Common Battery Manual Apparatus.

LEICH ELECTRIC CO.

LEICH ELECTRIC CO.,
Genoa, Ill.

We are considering the purchase of a.....line Switchboard.....lines installed. Send us your Prices and Specifications.

Company .....

Town..... State.....

Factory and Main Office: GENOA, ILL.

Western Branch: Kansas City, Mo.

DISTRIBUTORS

Electric Appliance Co.
Chicago San Francisco
Dallas New Orleans

St. Paul Electric Co.
316 Robert Street
St. Paul, Minn.

Telephony.

THE AMERICAN TELEPHONE JOURNAL

Comprising Telephony, American Telephone Journal, Telephone Weekly, Telephone Magazine, Telephone Securities, The Telephone, Sound Waves

PUBLISHED WEEKLY BY THE TELEPHONY PUBLISHING COMPANY
MONADNOCK BLOCK, CHICAGO
EASTERN OFFICE: 52 VANDERBILT AVE., NEW YORK CITY

H. B. McMEAL, PRESIDENT AND EDITOR. H. D. FARGO, SECRETARY AND TREASURER. J. C. KELSEY, VICE-PRESIDENT AND FINANCIAL EDITOR.
S. R. EDWARDS, MANAGING EDITOR. J. R. HASTIE, VICE-PRESIDENT AND ADVERTISING MANAGER.

Entered as second-class matter Septemper 4, 1908, at the post office at Chicago, Ill., under act of March 3, 1897

Volume 71
Number 26

CHICAGO, SATURDAY, DECEMBER 23, 1916

Subscription—10 Cents a Copy
$3 a Year U. S., Cuba and Mexico
$4 Canada, $5 Other Countries

A Bell Factory Fake.

In its efforts to induce Independent telephone companies to buy apparatus, the Western Electric Co. often tells them that the use of such equipment will bring them a better price in case they sell to the Bell interests.

A flat denial is made of the truth of this allegation in an interesting letter TELEPHONY has received from R. A. Klinge, of the Twin City Telephone Co., Pasco, Wash. Mr. Klinge has had personal experience in the matter and knows whereof he writes. Being full of interesting information, his letter is given in full:

"I note that 'Bill the Troubleman' usually gets on the first page in every issue of TELEPHONY and tells us about Western Electric sales to Independent companies. I have never seen any offer from anyone to help him out, with a solution to put a stop to it, but one—the Sherman anti-trust law. I don't know 'Bill' very well; in fact, I don't know him at all, so I will have to reach him through you.

"While I don't mean to stampede everyone and say I have found a way, still, we out here in the far West, have learned a whole lot during the last six months. Twelve years ago when we engaged in the telephone business, it was impossible, then as well as now, to buy 'universal service' transmission. We were compelled to purchase Independent sets and then lease 'universal transmitters and receivers' at the rate of $2 per annum for each set. This gave us the honor of signing a 'universal' contract and connecting with the 'one policy' concern, getting 15 per cent. on all originating business. (By the way, the Pacific Bell now tells the Washington Public Service Commission that the originating exchange should get fully 35 per cent.)

"In 1907 the Pacific Bell called in all the 'universal' sets and told us we could buy complete sets from the Western Electric Co. The writer bought a few but he noticed that the Western Electric sets did not read 'Property of the A. T. & T. Co.' The stencil simply said that they were manufactured by the Western Electric Co.

"This seemed to put a bug in my ear, and I never bought a W. E. set after January 1, 1908. Other Independent companies bought W. E. equipment exclusively on the strength of its being made by the same factory as supplied the Bell company. I cannot recall that the W. E. salesman said it was the same as that used by the A. T. & T. Co., but the statement that they made all the equipment used by the Bell seemed to have been sufficient to induce some Independents to buy it. The intimation that the W. E. plants always had a greater sale value also helped.

"Well, after eight years the Pacific company gets the ambition to own everything out here. Some of us sell, and others are forced to sell, through one crooked way or another. Now, let us see how we all fared as to sale value as outlined eight years ago:

"We find that the W. E. plants don't bring any more than Kellogg plants, or Dean plants, or plants using any other apparatus. The real fact of the matter is—the Pacific Bell calls all the plants 'junk.' Exclusive W. E. plants cannot be used by them any more than Kellogg, as they are only permitted to use equipment leased from the A. T. & T. Co.; also that the W. E. apparatus is about as worthless to them as Dean, and that they would have to junk it.

"One of these companies, which never gave an Independent salesman an audience or a smile, wakes up to the realization that his beloved W. E. plant—and common battery, at that—would have to be replaced, excepting the cable, with equipment leased from the A. T. & T.

"Now, what I am trying to get across to Brother Bill is—how would it be to let all the Independent manufacturers know these facts? They in turn could pass the information to all of their salesmen. Then it would only be a little while until the story reaches every Independent or locally-owned company.

"In my opinion, this ought to put a stop to a lot of Western Electric sales among Independents at once. It seems to me that W. E. salesmen will have a hard time inducing Independents to buy their apparatus, for if the Bell can't use it, where is the sale value?

"I know one company which had bought

from the Western and was afterwards told that universal service transmitters and receivers were never sold, only leased. If that is true, what have some of these chumps bought?

"Here is another question: Why does the public service commission permit the Bell to buy up good plants, 100 per cent. efficient, pay what they are worth, then dismantle them and put in its own equipment, then add the price of the dismantled plant to the investment of the new plant and finally charge a rate to cover the entire cost, clear and above the 4½ per cent. taken out of gross earnings?"

This certainly is a question that a state commission would undoubtedly find it difficult to answer satisfactorily. The preceding points in Mr. Klinge's letter should be given careful consideration by the Independent manufacturers. Probably they have received the same information before, but we are repeating it here in order to fasten the record.

Commissions, Courts and Councils

Discussions and Rulings of State Bodies Having Supervision Over Telephone Companies—Decisions of Courts in Matters of Interest to Public Utilities and Actions of City Councils Relative to Franchises, Rates and Service

Value of Holding Company to Local Utility Questioned.

The value of a holding company to a local utility is strongly questioned by the Illinois Public Utilities Commission in its recent decision in the case of the City of Lincoln vs. the Lincoln Water & Light Co. (2,496.) The commission, while admitting the value of the services of a holding company, is skeptical regarding its worth in this case, and is frank in so stating.

Inasmuch as the charge for the services of a holding company as discussed in this case is parallel to the 4½ per cent. gross earnings' tax imposed by the American Telephone & Telegraph Co., upon its subsidiaries, the comments of the Illinois commission are of exceptional interest.

The Lincoln Water & Light Co., it appears, is a subsidiary of an Eastern holding company, to which $2,000 has been paid annually for the holding company's services. In submitting its normal operating expenses, the utility claimed that the charge made by the holding company should be increased to $3,500 annually. The commission disallowed this increase. The commission's opinion relative to this charge for services of the holding company follows:

"'The charge of $2,000 in no manner can be considered in the light of a strictly good-faith trade between a willing buyer and a willing seller; instead it is an unregulated price, as high as the traffic will bear, as it were, dictated by the party most benefited—the holding company. The expenses of the holding company, however, are real and must be met; but shall these expenses be assessed in full as an operating charge against the public of the city of Lincoln, or should a portion thereof be borne by the investors who reap their gains from the profits of constituent companies?

In general, money seeking investment entails its cost just as surely as do projects seeking money. The organization of a typical holding company (and for purposes herein it will be assumed that it be a modern holding company, engaged in lawful and proper pursuits) embraces auditors to conduct accounting investigations of subsidiaries, engineers to plan extensions and betterments, efficiency experts to point out operating improvements and refinements, purchasing agents to buy supplies in large quantities at the market's best, attorneys to protect legal rights, financiers to arrange for the always-needed capital requirements of the constituents, and other similar and allied departments.

Undoubtedly, a local utility will receive several benefits in a course of years from a well conducted holding company, and the public of that local community should be willing to sustain payments to a holding company whenever the holding company renders real service and gives value received in the amount charged to the community; but it is nevertheless a fundamental fact that the organization of the holding company is primarily for the protection of the financial interests involved—to render more secure the holding company's investments, to enhance the earnings of the subsidiaries for the benefit of the holding company, and to investigate and report upon, not only the existing subsidiaries, but also contemplated new subsidiaries, all for the ultimate benefit of the holding company.

The public of a city served by a subsidiary is not particularly benefited, either directly or indirectly, by several of the holding company's expenditures, and, in general, there can be no logical reason for apportioning all of a typical holding company's expenses among the constituents.

In the case at bar, the holding company's expenditures have not been presented, and there is no method of ascertaining from the record what portion of its expenses are charged to its constituents, nor of determining what is the system of apportioning the same among the various subsidiaries. Viewing the situation, however, from the benefits which may accrue to the citizens of the city of Lincoln, it is the opinion of the commission that $2,000 annually is a sufficient and adequate operating charge to be borne by the public, under the operating conditions and service consumptions existing at the date of the valuation.

It is believed, moreover, that the respondent's present managerial salary coupled with present office salaries plus the said allowance of $2,000 to the holding company would ordinarily be quite adequate, if carefully and reasonably redistributed, to provide for an excellent and full local organization in the city of Lincoln, were the respondent severed from its parent.

It is not to be overlooked that much of the service customarily rendered by a holding company is such as would be properly chargeable to the capital account. Preliminary and legal expense, as well as engineering, may be performed by the holding company, and such expenses are reflected in the overhead allowances made by the appraisers. The charge to operation of $2,000 should not be expected to compensate the holding company for charges which with accurate bookkeeping would be taken up on the respondent's capital accounts; such compensation is inherently contained in the valuation fixed herein.

The said allowance of $2,000 must be regarded as compensation for operating services only; and for such services the commission believes the said sum to be quite fair and adequate, particularly in view of the record herein, which discloses that the respondent's operation and management are not so superior to the average run of isolated independent utilities as to warrant large service fees to the holding company."

Hearing on Telephone Supply Contracts in Massachusetts.

The Massachusetts Public Service Commission gave a hearing at Boston, December 13, upon the petition of Charles H. Porter, of Waban, for an investigation of the purchase of supplies by the New

England Telephone & Telegraph Co. from the Western Electric Co.

E. K. Hall, vice-president of the New England company, was called upon by Chairman F. J. McLeod to explain the company's position. He said the petitioner assumes that the prices paid by the New England company could be duplicated for the same adaptable equipment and that first cost is the chief element in the purchase of apparatus.

Cost in the long run, Mr. Hall said, is the fundamental element. Standardization is a factor of great importance in relation to continuous and adequate service. At no time in the past two years has the New England company been obliged to refuse service because of the inability of the Western Electric Co. to furnish the necessary supplies, although changes in development plans have resulted now and then from freight embargoes.

The company has some doubt as to the jurisdiction of the commission over the purchase of supplies, but desires to furnish full information as to the advantages of the present Bell-Western Electric arrangement. The speaker urged the commission to visit the Western Electric factories and the Western Electric and A. T. & T. Co's. laboratories to acquire a first-hand knowledge of the facilities there afforded for telephone standardization and development.

Commissioner J. B. Eastman asked if it were not a fact that the most important developments in the telephone art came after the expiration of the fundamental Bell patents. Mr. Hall denied this, stating that while some progress had been made by Independent manufacturers, he recalled no fundamental inventions outside the Bell organization. No reference was made by the speaker to automatic telephony.

Mr. Hall said that in the early days it would not have been possible to secure the progress which has been made, on the basis of buying supplies on competitive bids.

"We regard the Western Electric Co. as an integral part of the Bell system," said the speaker, "as much as the staff of the A. T. & T. Co., in New York. So far the Western Electric Co. has not been subjected to public regulation, but it unquestionably would furnish any rate-investigating commission all proper data as to costs."

Replying to an inquiry of Commissioner Eastman, Mr. Hall said he understood that the Federal Trade Commission is interested in the relations between the Western Electric Co. and the Bell system of operating companies and that some sort of an investigation has been requested by outside manufacturing interests, which desire to have the Western Electric output confined to the Bell companies.

At present the New England company is using 10,000 new desk sets a month and the capacity of Independent manufacturers is of doubtful size to meet the demands of such a company.

Chairman McLeod remarked that Independent manufacturers would scarcely be expected to maintain capacity equal to meeting the demands of a market closed to them by such an arrangement as that between the New England company and the Western Electric.

Mr. Hall said that business of the Independent manufacturers is held down by the necessity of individual companies in concentrating upon one style of equipment, a practice that the speaker maintained does not conduce to best service.

Albert H. Meads, representing the Kellogg Switchboard & Supply Co., of Chicago, filed a statement with the commission.

Telephone Companies to File I. C. C. Reports by March 31, 1917.

F. B. MacKinnon, of Washington, D. C., vice-president of the United States Independent Telephone Association, has sent out to member companies letters calling attention to the recent order of the Interstate Commerce Commission relative to the filing of annual reports for the 12 months ending with December 31, 1916, on or before March 31, 1917.

The necessary forms for this report will be sent to the various companies by the Interstate commission. The forms for the A, B and C class companies with a few minor changes are the same as for 1915. The D class companies will be asked again to fill out the same form that was sent them last January, the green circular known as Circular 14. All companies, therefore, will be expected to supply the commission with information on practically the same forms as they did for 1915. If there are any questions in regard to the report forms or the understanding of this order, the United States association will be glad to have any telephone company communicate with its Washington office.

State's Right to Fix Rates Upheld by Oregon Supreme Court.

The supreme court of Oregon in a decision rendered December 5, in the case of the City of Woodburn vs. the Oregon Public Service Commission et al., appellants, held that under the police power of the state the public service commission is vested with absolute authority to override the provisions of the city charters in fixing public utility rates. The opinion was written by Justice Harris, and is one of the most important public utility decisions ever rendered by the court. It reverses the decision of Circuit Judge Galloway of that district.

The Western Telephone Co., which operates under a charter granted by the city of Woodburn fixing rates it might charge for its services, was made defendant with the commission.

In 1915 the company applied to the commission for permission to increase its telephone rates beyond those fixed by the charter, and the commission granted the permission after the company had effected a consolidation with a competing telephone plant. Challenging the commission's power to override a city charter, the officials of Woodburn commenced proceedings to vacate the commission's order.

"The right of the state to regulate rates by compulsion is a police power, and must not be confused with the right of a city to exercise its contractual power to agree with the public service commission upon the terms of a franchise," said Justice Harris, in part. "The exercise of the power to fix rates by agreement does not include or embrace any portion of the power to fix rates by compulsion.

"When Woodburn granted a franchise to the telephone company, the city exercised its municipal right to contract, and it may be assumed that the franchise was valid and binding upon both parties until such time as the state chose to speak, but the city entered into a contract subject to the reserved right of the state to employ its police power to compel a change of rates, and when the state did speak, the municipal power gave way to the sovereign power of the state.

Thhe power to fix rates by compulsion as distinguished from the power to fix rates by agreement, is not granted to cities or towns, nor is the right of a legislative assembly to legislate upon that subject curbed, by section 2 of article II of the state constitution, because in its essence it is neither a municipal power nor an incident to pure municipal power."

Iowa May Place Telephones Under State Jurisdiction.

The placing of complete jurisdiction over all telephone and power transmission lines in the state of Iowa in the hands of the state railroad commission or of a special utilities commission will be attempted in the thirty-seventh general assembly, according to reports now being circulated by members of that body.

Dissatisfaction with existing conditions has developed among the Independent farmers' telephone lines to such an extent that some such action will have behind it the strong support of many of the members from the rural districts.

The owners of grounded rural lines are experiencing considerable trouble, due to inductive interference with power lines. The only solution for the difficulty probably lies in keeping the wires far enough apart to prevent induction, and a method of regulating by which both

the telephone and the high tension lines are put under control of one body is believed to be the only practical method for handling the situation.

Iowa is one of the five states in the union in which the wires of telephone and power companies are not under state supervision.

Public utility men are declaring that little assistance in the fight for a public utilities commission is to be expected from the Bell company in Iowa this year because that company has its franchise and does not intend to participate in any fight for a commission.

The power electric railroads, city railways and Independent telephone companies however, are planning a campaign for the passage of such a measure by the thirty-seventh general assembly, according to legislators who have been in Des Moines and are confident that a measure similar to that which has been before the last two general assemblies will be passed this year.

Regulation Charges — Necessity for Appeal to Commission.

Action was brought by a telephone subscriber to enjoin the telephone company from removing a telephone and compelling it to continue service at a stated rate.

It appeared that the company's predecessor received a grant in 1887 to operate a telephone line which required the installation of the most modern and improved instruments and appliances, and provided that for a certain class of service the rate for a single ground return line for a period of six years from 1887 should be $48 per year. At the expiration of that period the rate was increased for metallic circuit to $100.

In 1897 the defendant reduced that rate to $80, and received a further grant to put its lines underground upon condition that it should not thereafter raise its rates. The plaintiff sought to require the company to furnish him telephone service at the rate of $48.

The New York Appellate division holds that the original grant had no application after the six-year term, that the condition of the grant of 1897 that the rates should not be raised did not apply to the original rates, but to the rates then in force, and that he could not require the company to furnish the metallic circuit at the original rate of the 1887 grant. To furnish a ground return service would be contrary to the terms of the grant, which required the most modern appliances for the conduct of the business.

Under New York Laws 1910, c. 673, the public service commission was given general supervision and control over telephone and telegraph companies. Public Service Commissions law, section 92, requires telephone companies to file with the commission schedules of rates, and prohibits the charging of different rates than those specified in the schedule.

Section 97 confers upon the commission jurisdiction to determine the tariffs which may be charged. The plaintiff ignored the commission, and brought his action directly to the courts. It was held that he could not recover for alleged illegal charges without an appeal to the commission, from whose decision, if discriminatory, he could appeal to the courts. Murray vs. New York Telephone Co., 156 New York Supp. 151.

Seattle (Wash.) Telephone Franchise Forfeiture Case.

Assistant Corporation Counsel Walter F. Meier, of Seattle, Wash., has prepared his answer in the suit of the Pacific Telephone & Telegraph Co. and the Sunset Telephone & Telegraph Co. against the city of Seattle which will be again brought before the United States district court on a demurrer entered by the city.

The Bell companies seek to restrain the city from enforcing an ordinance passed by the city council July 29, 1912, revoking the franchise of the Home company of Seattle, which the Bell companies claim to have acquired in March of that year. Should the court uphold the city's right to enforce the revocation, the city would be able to claim all the Independent property in the streets of the city and to exact rent for its use by the Bell companies.

Mr. Meier argues that the Independent company forfeited its franchise by refusing to make extensions of its service after accepting 14 contracts, which were for telephones all within a radius of a quarter of a mile, the franchise requiring that such extension be made on contracts for not less than ten telephones within that radius.

The answer repudiates the acceptance of free telephone service by the city under the terms of the Independent franchise, and the installation of fire alarm telegraph wires on poles and wire belonging to the company, as done without the consent or knowledge of the city council. It states also that the Pacific company's own franchise grants to the city a free telephone service and the right to make similar installations.

Physical Connection Ordered at Laddonia, Mo.

The Missouri Public Service Commission, in the case of L. W. McCoy vs. the Buffum Telephone Co. and the Laddonia Rural Telephone Co., on December 12, ordered that a connection be made between the lines of the two companies for toll service.

The Buffum Telephone Co. is owned and controlled by the Bell company and has a toll station at Laddonia, Mo. The Laddonia Rural Telephone Co. is owned by about 400 farmers and business men living in and around Laddonia and operates an exchange in Laddonia and farmer lines in that vicinity.

L. W. McCoy and about 40 other complainants are subscribers to the service of the Laddonia Rural Telephone Co., and filed a complaint with the public service commission, stating that they desired connection between the long distance lines of the Buffum Telephone Co. and the local switchboard of the Laddonia Rural Telephone Co.

The Buffum Telephone Co. in its answer stated that it was willing and anxious to make the connection and furnish the long distance service and that the connection would be made at its expense. The Laddonia Telephone Co. objected to the connection on account of the increased expense, stating that it would be necessary to employ an additional operator. Case 1,054.

Important Decisions of the Minnesota Commission.

Two recent decisions of the Minnesota Railroad and Warehouse Commission are of special interest to Minnesota telephone men.

One was in the case of the Walker Telephone Co., which asked permission to increase rates. This application was not granted, as reported in TELEPHONY of December 16, page 24. The commission's action indicates that the companies must present positive evidence of their need for the increases requested.

The other case was the complaint of Brita Paulson upon the refusal of the Clifton Rural Telephone Co. to furnish her with telephone service. This company is a rural organization and operates out of Anoka, connecting with the switchboard of the Bell company in that city. This decision, published in TELEPHONY of December 9, page 34, compels the company to furnish the service.

Postmaster General Recommends Government Ownership.

Postmaster General Burleson in his annual report to congress recommends that early action be taken declaring a government monopoly over all utilities for the public transmission of intelligence, and that as soon as possible the telephone and telegraph facilities of the United States be incorporated into the postal establishment.

He also recommends that $300,000 be appropriated now for acquiring telegraph and telephone utilities in Alaska, Porto Rico and Hawaii.

To Revoke Arkansas Charter of Western Union Company.

A petition asking that the Western Union Telegraph Co.'s Arkansas charter be revoked for alleged violation of act

373 of the acts of 1907 has been filed with Secretary of State Earle W. Hodges by Davies & Davies, attorneys for William Overman, of Hot Springs.

Mr. Overman sued the company for damages for alleged failure to deliver a message. The petition alleged that the company had the suit taken from the state courts to the Unied States District Court at Little Rock over protest of the plaintiff. Such an action, it was claimed, is a violation of the state law and the penalty is revocation of the offending company's charter.

Mr. Hodges has written the attorneys for proofs of the company's alleged action, and when these are received he will conduct a hearing on the petition.

Bill for Federal Ownership in District of Columbia.

As an experiment in government ownership Representative Lewis of Maryland, on December 13, introduced in the house a bill providing for the taking over of the telephone system of the District of Columbia by the government. At the same time he made a statement contending that the best way of determining whether the government could operate the telephone systems to an advantage was by trying it.

Mr. Lewis also proposes in his bill to adjust rates to enable subscribers in the District of Columbia to use the telephone to meet cost of living problems. This he proposes to do by reducing rates to enable the consumers of the city to communicate cheaply with farmers near Washington and to order supplies to be sent by parcel post.

Ohio State to Sell New Stock Issue to Stockholders at Par.

The Ohio State Telephone Co. will offer the $2,000,000 additional 7 per cent. preferred stock, recently approved for issue by the Ohio Public Utilities Commission, to its stockholders at par on the basis of one share of the new stock for each five shares of common or preferred stock now held.

Large B. P. X. in New Office.

A private branch exchange switchboard with a capacity of 700 lines has been installed in the new million-dollar office building of the Bethlehem Steel Co. at Philadelphia, Pa.

Summary of State Commission Hearings and Rulings.

CALIFORNIA.

December 18: Hearing on application of the Pacific Telephone & Telegraph Co. for a certificate that public convenience and necessity require the exercise by it of the rights and privileges conferred upon the company under a franchise granted by the city of Alameda in 1915. This proceeding is for the purpose of settling all doubt of procedure to make the Alameda franchise valid.

FLORIDA.

January 16: Hearing at Pensacola, Fla., to determine whether or not there ought to be any change made from the present telephone exchange radius in the city of Pensacola, and if so, should that radius be made to conform to the present corporate limits of the city; and to consider and determine any increase or reduction in tolls or rates for telephone service incident to the change of exchange radius.

ILLINOIS.

December 4: The commission approved the contract of the Indiana Harbor Belt Railway Co. with the Chicago Telephone Co., providing for the placing of a line on its right of way at Franklin Park, Ill. Case E-610.

December 4: The commission approved the contract of the Toledo, St. Louis & Western Railroad Co. with the Morrison Brothers Telephone Co., providing for changing from overhead to underground crossing in Fayette county. Case E-598.

December 19: Hearing at Springfield in the matter of the complaint of the City of East St. Louis vs. the Southwestern Bell Telephone Co. of Illinois, relative to rates charged for telephone service in the city of East St. Louis. Case 5,100.

December 19: Hearing at Springfield in the matter of the complaint of the village of LaPrairie, Ill., vs. the Shilo Telephone Co., the German Mutual Telephone Co., the Houston Telephone Co., the Eli Telephone Co. and the reorganization committee of the Western Illinois Telephone Co., relative to insufficient service at the village of LaPrairie. Case 5,565.

December 19: Hearing at Springfield on the application of the Porterville Telephone Co. for a certificate of convenience and necessity to operate a telephone system in the village of Porterville and vicinity; also the application for an order authorizing the issue of $2,350 of its common stock. Case 5,732.

December 20: Hearing at Springfield in the case of the Evansville Telephone Co. vs. the Okaw Valley Mutual Telephone Association, relative to the complaint of the defendant company constructing and operating a telephone system in the village of Evansville without a certificate of convenience and necessity from the commission. Case 5,525.

December 20: Hearing at Springfield in the matter of the complaint of the Westfield Mutual Telephone Co. vs. the Ashmore Mutual Telephone Co. relative to the refusal of the respondent company to furnish long distance connections at Westfield, Ill. Case 5,672.

December 21: Hearing at Springfield on the application of the Harvey Mutual Telephone Co. for authority to change telephone rates of subscribers who are all stockholders at Harvey and vicinity. The applicant was cited to appear before the commission on this date to show cause why it failed to comply with the order of the commission dated June 21, 1916. Case 3,397.

MICHIGAN.

January 9: Continued hearing at Lansing on the application of the Michigan State Telephone Co. for permission to establish a metered schedule of rates in Detroit.

MINNESOTA.

December 16: In answer to the petition of Ole J. Berg, Peter Heplin and others for telephone service in the depot of the Great Northern Railway at Brandon, Minn,. the company has advised the commission that it will have the telephone installed as soon as possible. Case M-140.

December 18: In the matter of the petition of Dr. P. D. Whyte and others for telephone service in the depot of the Chicago, Rock Island & Pacific Railway Co. at Hardwick, Minn., the railway company having advised that it will have a telephone installed in its depot at Hardwick as soon as possible, the commission dismissed the proceedings in this case. Case M-134.

December 19: Hearing in the matter of the application of the Northwestern Telephone Exchange Co. for permission to purchase the Bloomington and Savage exchanges from the Shakopee Telephone Co.

MISSOURI.

December 12: Upon the complaint of L. W. McCoy and about 40 other subscribers of the Laddonia Rural Telephone Co., the commission ordered that a physical connection be made between the lines of the Laddonia Rural company and the toll lines of the Buffum Telephone Co. Case 1,054.

OHIO.

December 19: Hearing at Columbus on complaints against the Elyria Telephone Co., of Elyria, Ohio, relative to alleged excessive rates.

OREGON.

December 9: Petition filed by the Waldport Telephone Co. and the Yachats Telephone Co., of Waldport, Ore., for permission to increase the monthly rental rate from $1 to $1.25. The petition alleges that the Industrial Welfare Commission has ordered wages of not less than $8.25 for an experienced operator and $6.25 for an apprentice in the joint office of the Waldport and Yachats telephone companies at Waldport, thus increasing the expense of operation.

OREGON.

December 20: Hearing at Tillamook, Ore., in the complaint of the Tillamook County Mutual Telephone Co. against the Pacific Telephone & Telegraph Co. The plaintiff charges that the defendant will not interchange service and that this constitutes discrimination.

PENNSYLVANIA.

December 7: The commission approved the contract between the Bell Telephone Co. of Pennsylvania and the township of Annville, and the contract between the United Telegraph & Telephone Co. and the borough of Palmyra, both for franchise rights.

WISCONSIN.

December 14: Hearing at Kilbourn, Wis., in regard to the alleged inadequacy of service and rates of the Farmers' Inter-County Mutual Telephone Co. U-998.

December 15: Hearing in the case of the Wisconsin Public Service Co. vs. the Brown County Telephone Co. relative to the construction of telephone lines in Brown county. U-996.

December 19: Hearing in the case of the Wisconsin Telephone Co. vs. the city of Kenosha, relative to an unreasonable city ordinance. U-999.

December 28: Hearing at Mondovi, Wis., in regard to the investigation, on the motion of the commission, of the alleged refusal of the Gilmanton and Dover Farmers' Telephone Co. to extend service to M. O. Quarberg. U-1,002.

Transmission Line Interference

Causes and Conditions of Inductive Disturbances from Power Lines—Suggestions as to Telephone Line Construction with Reference to Power Lines—Paper Presented at Convention of United States Independent Telephone Association

By L. E. Hurtz

In the preparation of this paper, liberal use has been made of many articles that have been printed in technical journals, reports of state commissions and various sets of specifications and rules.

Today, in the forty-first year since the invention of the telephone, every city, town and hamlet in the United States is connected with every other by means of the great network of telephone wires. Practically every farmer has equipment in his house by means of which he can speak directly to almost every person in the nation.

Telephone Development.

The distribution of electric current for light and power, although developed some years earlier than telephonic communication, has only recently reached out in a comprehensive way into the rural districts.

Our cities are all well supplied with electric light and power. Some of the smaller towns and villages contain generating stations; others are supplied from central power plants by means of high voltage electric transmission lines. The tendency today is to centralize electric power production and distribute the current to the smaller places. Thus our rural districts contain many interurban electric transmission lines and some lines delivering electric light and power to farmers.

In the near future we may look for great extension of these lines, due to the better service and cheaper production possible in large central stations or at water power plants, and due to the growing demand of the rural population for electric lights and power.

Thus, added to the great network of telephone wires covering our country, we find a growing network of electric lines. Complete development of both industries will require, in many instances, the presence of both classes of lines on the same highway, thus producing conflicts of various kinds, some serious in their character and others of relatively little importance.

The rights of telephone companies and electric light companies to build on the highways are derived from various sources in different states. The rights acquired by prior occupancy have been passed on in many courts.

Under the law one person cannot injure the property of another without being liable for damages. Consequently, it is contended that a telephone company, which is legally occupying a highway, has a right to recover damages, if an electric line is built so near it as to injure its property or service. The legal phases of this question vary with the location and the conditions under which the two utilities have obtained their franchises or rights to occupy the highways.

In general, however, a person or corporation which has legally located a line and is operating it and serving the public, has a right to expect that its service will not be interfered with by others. Recourse to the courts and commissions to settle technical questions is usually unsatisfactory. The utilities affected should co-operate with each other and avoid litigation. Without attempting to discuss the legal questions involved, we will pass to the technical subject of electrical interference.

In the development of the two networks of overhead wires, one telephone and the other high power transmission lines, it will be impossible to avoid places where the lines will come into close proximity. At such points, the power lines are liable to interfere with the telephone lines by actual contact between the two systems or by induction.

Actual contact between the high power lines and the telephone line, either direct or through a third conductor or medium, brings the high voltage to the telephone system, thereby interrupting the service and creating a life and fire hazard with which we are all familiar. Such a contact between two systems in close proximity would be caused by failure of construction or crosses due to improper arrangement of the lines or careless maintenance.

Hazard of Physical Contact.

Little difficulty is ordinarily experienced in providing against direct contact between power and telephone wires. Everyone realizes the danger of coming in contact with wires carrying high voltages so that careful construction men have always taken some measures for protection against this hazard.

For relatively low voltages, the separation can be limited to safe working space for linemen. Telephone apparatus cannot withstand high voltages. For voltages of 2,500 or over between line and ground, or 5,000 and over between wires, special construction must be used.

The precautions taken to guard against contacts at crossings or at points of parallelism, involve a study of the relative positions of the lines, the clearances between power and telephone lines and the strength of the construction.

Relative Position of Lines.

The power lines at crossings should occupy a position above the telephone lines. This is desirable because the power wires, in general, are larger than the telephone wires and hence less liable to fail. The power wires are generally fewer in number than the telephone wires, hence stronger construction in the power line can be more readily provided.

If the telephone lines were above the power lines, there would be a great hazard to employes working on the telephone lines since they are not familiar with handling high voltage wires.

Clearances Between Lines.

The vertical clearances between the two classes of wires at crossings should be such as to keep them safely separated under all conditions of temperature and loading, and to allow space enough for men to work on the lower lines without coming in contact with those above.

The minimum horizontal separation between the two pole lines should be equal to the height of the taller poles. However, this amount of horizontal separation is not a sufficient precaution against inductive interference.

The construction of the line in the upper position at crossings should have a suitable margin of safety against failure when subjected to the most severe conditions of ice and wind loading.

Inductive disturbance on a telephone line reduces its efficiency. It may interfere seriously with the transmission of speech. It may injure the parties using the line and those operating it and may be sufficiently serious to create a life and fire hazard.

These disturbances are due to the combined effects of electromagnetic and electrostatic induction. All wires transmitting alternating currents are surrounded by electrical fields which induce current in varying quantities to any other wire or wires within that field.

Whether or not the interference will be substantial, depends upon the character and intensity of the electrical field, together with the length and proximity of the exposure of the telephone wires to this field and to the electrical characteristics of the telephone line.

Many of the factors causing inductive interference in telephone lines are of negligible importance to the operation of the power transmission lines, but are subject to control by the power company.

It is a matter of prime importance to both utilities and the public to know that many of the causes of substantial interference can be avoided almost entirely if provided for in advance of the construction of the high power transmis sion lines at little, if any, additional expense.

Thus, it will be seen that the most important element to be considered in avoiding or mitigating substantial interference to telephone service, due to proximity of high tension transmission lines, is co-operation between the utilities. Much co-operative work is now under way between the telephone and power interests and some state regulating bodies are attempting to require it—for co-operation, in the fullest measure between the utilities, is not only desirable but necessary.

The most important matters to be considered in avoiding inductive interference are the location of the proposed lines, the design of the equipment and lines, and their operation. These elements may be controlled and thus avoid or practically eliminate all interference, if the power and telephone companies will co-operate in the interest of better service to the public from both utilities.

It seems extraordinary that there has been so much controversy in the past caused by high tension interference to telephone lines when most of the causes of interference are subject to control. This condition, no doubt, has arisen from the rapidity of development of both utilities and the lack of information, until recently, of the principal causes of the disturbances.

Causes of Inductive Interference.

Prior to discussing the methods of avoiding or mitigating inductive interference, we will consider its causes.

The conductors of a high voltage transmission line are surrounded by an electrical field, the extent of which depends upon many factors to be considered hereafter. A telephone line which parallels a transmission line is thus affected by the electrical field surrounding the transmission wires.

The amount of interference to telephonic communication will depend upon the amount and character of current induced in the telephone lines, thus producing a humming noise which interferes with telephonic transmission, reduces the efficiency of the telephone line and, in many cases, produces noises and other conditions of an unpleasant and often dangerous character. The magnitude of the interference depends upon many factors, some of which are as follows:

Design of power apparatus; length of parallel; horizontal separation; voltage of transmission line; relative positions of power wires; transpositions; efficiency of power insulators; balance of the power circuits; transformer connections; and operating rules and practices.

Before discussing the foregoing causes of inductive interference, let us quote from the report on inductive interference to the California Railroad Commission, July 30, 1914.

1. Interference to telephone circuits under normal operating conditions of power circuits arises almost wholly from the harmonic voltages and currents of the power system.

This is due chiefly to the fact that the frequencies of the harmonics generally present in the voltages and currents of power systems cover a considerable portion of the range of the voice frequencies, particularly those frequencies at which telephone instruments and the human ear are of maximum sensibility. Extraneous currents of frequencies approaching the average voice frequency have a more injurious effect upon telephone conversation than currents of lower frequencies.

2. The effect of induction of the fundamental frequency on telephone circuits is comparatively unimportant unless it is of magnitude sufficient to constitute a physical hazard.

This is due to the fact that the fundamental approaches the lower limit of audible frequencies, at which the telephone and the human ear are not efficiently responsive.

3. Interference to telegraph and other signaling circuits is due principally to the fundamental and lower harmonics.

Telegraph receiving instruments are relatively insensitive, as compared with the telephone, to the higher harmonics, but are sensitive to disturbances of lower frequencies, such as the fundamental and lower harmonics which more nearly approach the normal operating frequency of such circuits.

4. The power circuit currents and voltages may be divided into two factors—balanced and residual of which, for equal magnitude, the latter in general produce the greater inductive interference.

Residual currents and voltages act inductively in a similar manner to single-phase currents and voltages acting in a circuit composed of the line conductors in parallel with earth return, which is a condition favorable to very large induction. Moreover such a circuit which includes the earth as one side can not be transposed.

Transpositions in the power circuit can not reduce the inductive effect of residuals except as they reduce the magnitudes of the residuals themselves, which they do in some cases. The inductive interference arising from such currents and voltages can be reduced only in the case of metallic circuits, such as telephone circuits, by transposing these circuits.

It is, therefore, important that the telephone circuits be transposed at frequent intervals throughout parallels and carefully balanced throughout their entire length; and that the residual currents and voltages be kept sufficiently small to give negligible induction in telephone circuits so arranged.

5. Inductive interference to communication circuits, arising from the balanced voltages and currents, can in a large measure be prevented by means of an adequate system of transpositions applied to both power and communication circuits (assuming the latter are metallic) and located with due regard to each other.

This is accomplished partly by creating mutually neutralizing inductive effects in neighboring lengths of each side of the communication circuit or circuits by transposing the power circuit, and partly by equalizing the inductive effects on the two sides of the communication circuit or circuits by exposing each side equally to the influence of the power circuit by transposing the communication circuit.

6. Abnormal conditions, and at times switching operations, produce transient disturbances of a very severe character.

This is due to the fact that abnormal conditions almost invariably give rise to residuals of large magnitude, often including high harmonics. Abnormal occurrences incident to electrical power transmission do not give warning of their occurrence. Since they can not be produced artificially on transmission systems without subjecting the apparatus to great risk or danger, it has been deemed unwise to attempt any experimental tests of these effects. The conclusion is, therefore, drawn from general experience and data of actual occurrences collected by the committee.

In discussing the following subjects it must be understood that innumerable conditions affect each case so that the conclusions here drawn must be considered as applying to average rather than to exceptional cases.

Design of Power Apparatus.

The one most important precaution to be taken in avoiding or reducing inductive interference in telephone lines paralleled by transmission lines, is the proper design of the power apparatus.

The noise caused in telephone circuits by currents induced from transmission lines is almost entirely due to the irregularities in the wave shape of the power voltage and current, known as harmonics. There would probably be no noise on telephone lines due to induction from transmission lines, if the power equipment were so designed as to eliminate the presence of the higher harmonics in the current and voltage wave shapes, although induction due to the fundamental frequency may be of sufficient magnitude to constitute a physical hazard.

If the waves are modified so as to be pure sine waves, the noise will practically disappear. This is due to the fact that the components of lower frequencies have relatively lesser inductive effect than the high frequency currents and also because they are below the range of frequency for which our telephone apparatus is sensitive.

The range of frequencies of voice currents is from 200 to 2,000 cycles per second, with an average of probably 800 cycles per second. Thus, 25 or 60-cycle induced currents have little, if any, effect upon the telephone receiver. Unfortunately most of induced currents contain harmonics of a frequency that can

be heard in the ordinary telephone receiver.

For many years the manufacturers of electric apparatus have been studying wave shapes and much progress has been made toward the refinements now required to avoid inductive interference.

Interference sometimes is noticed from parallel direct current systems due to superposed fluctuations of relatively high frequency, but these can be practically eliminated in the design of the machines.

Interference from parallel alternating current power lines can be reduced by changes made in the apparatus to reduce the harmonics in the voltage and currents generated. Changes in existing apparatus, however, are seldom practicable. When specified in new generators and motors, this result is obtained at little, if any, extra expense.

Transformers inherently cause wave distortion. Therefore, special care in design is necessary if they are to be used on lines parallel to telephone circuits.

Special apparatus has been devised to reduce the higher harmonics or to keep them from appearing on the line. It is considered much more satisfactory, however, to have the equipment designed so that less harmonics are produced rather than to attempt to control them with special equipment.

Length of Parallel.

In general the amount of interference expected on a telephone or telegraph line paralleled by a high power transmission line, will vary with the length of the parallelism, but not necessarily in direct proportion to the length. In other words, it may be expected that a ten-mile parallel will cause more interference and possibly twice as much as a five-mile parallel, when all other conditions are the same.

In general the amount of interference on a telephone line paralleled by a high voltage transmission line will vary inversely in some mathematical ratio, with the horizontal separation between the two lines. In other words, with all other conditions equal, we should expect less interference on a telephone line paralleled by a transmission line with a separation of 300 feet than if the separation was 100 feet.

Voltage of Transmission Line.

In general the amount of interference to be expected on a telephone line paralleled by a high voltage transmission line will vary with the voltage of the transmission line.

Thus we may expect less interference on a telephone line paralleled by a transmission line carrying 13,000 volts than by one carrying 33,000 volts, when all other conditions are the same. This variation is not necessarily directly proportional to the voltage.

Experiments have shown that the inductive interference on parallel telephone lines is approximately one-half as great when the three wires of a three-phase non-grounded system are arranged equal distances apart in the form of a "delta," than if arranged in a straight line. This delta arrangement also lends itself readily to inexpensive transpositions.

Transpositions.

The power wires should be transposed at regular intervals in order that the induced voltage from each of the wires to the earth and that all disturbing effects of balanced currents and voltages may be neutralized as nearly as possible. The interference from residual currents and voltages cannot be materially reduced by transpositions of the power lines.

Both the power and telephone wires should be transposed throughout parallels according to a prearranged plan in which the schemes co-ordinate. Both classes of circuits should preferably be transposed throughout their lengths. This is always necessary in case of the telephone line if it carries many circuits, to reduce cross talk.

All of the wires of the power line must be thoroughly insulated from their supports as a pre-requisite to balancing the insulation resistance to the ground.

Balance of Power Circuits.

The power circuits must be as nearly perfectly balanced as possible. Tree grounds, broken insulators, defective lightning arresters, unbalanced load between the phases, single phase taps on three-phase lines, open circuits and a multitude of other conditions, unbalance power lines to such an extent that substantial interference to parallel telephone lines may be experienced.

An alternating current power circuit, consisting of a single wire with a ground return, like many electric railway systems, sets up electric and magnetic fields of considerable magnitude which cause serious inductive disturbances on telephone lines located at considerable distances from the tracks.

Telephone systems cannot be operated satisfactorily in proximity to ground return power lines.

The magnitude of inductive effects from high voltage transmission lines is greatly reduced by the neutralizing action of opposite currents and voltages in wires of the same circuit, especially if the wires of a circuit are close together. The best results are obtained when the currents and voltages are most nearly balanced—that is, when the vector sum of the currents and voltages in a three-phase circuit equals zero and when the currents and voltages in a single-phase circuit are equal and opposite in the two wires.

To sum up: A condition of perfect balance from the telephone interference point of view allows no flow of current from the lines to earth. In star connected systems with grounded neutrals, current may flow through the earth, thus producing unbalanced conditions and disturbances on parallel telephone lines. Power systems using grounded neutrals should be avoided. If this system is grounded at one point only it helps reduce the trouble.

In delta connected systems isolated from the ground, this flow of current is not possible, but charging currents flow to the earth from the line wires. These may be unequal and thus disturbing but may be neutralized by transposing the power line.

Voltages to ground in ungrounded systems depend on the capacity of the lines to ground. Therefore a transposed power line will have equalized capacity and balanced voltage to ground from the several wires.

Single-phase taps taken from three-phase lines without using transformers cause unbalanced capacities which cannot be balanced by transpositions.

Sometimes badly unbalanced conditions on power circuits do not render them inoperative while they cause serious interference on parallel telephone circuits. Special indicating apparatus and close co-operation are necessary to reduce this hazard.

Transformer Connections.

The type of transformer connections used has a very important bearing on inductive interference with parallel telephone circuits.

The principal types in use are: "Delta" connections free from grounds; "star" connections free from grounds; "star" connections with neutral wire grounded.

These types use three-phase transformers or three single-phase transformers. In another type, known as the "open delta," connections are similar to the "delta" but in it only two transformers are used.

Of these types of transformer connections, the "start" type having the grounded neutral and the "open delta," are the most objectionable from the inductive interference point of view. Combinations of delta or star wound primaries with delta connections on the transmission line have been found more satisfactory.

The magnitude of the harmonics appearing in the line currents and voltages depends not only on the wave shape of the generators and motors, but also on the transformer connections. When an open delta connection is used, the third harmonic magnetizing current and the odd multiples of the third are supplied through two of the line wires.

In the case of a symmetrically closed "delta connection," these currents circulate locally in the transformer bank and do not appear on the line circuits.

An unbalance in the loads on the dif-

ferent phases tends to distort the wave shape. It is important, therefore, that the system be designed so as to avoid unsymmetrical arrangements as far as practicable.

OPERATING RULES AND PRACTICES.

Both the power and telephone companies should prepare operating rules designed to get the best results under both normal and abnormal conditions. These rules should take into consideration all the conditions to be met in normal operation and should provide specific instructions to be followed covering each abnormal condition that can be anticipated.

Power equipment should not be operated at voltages or loads greater than that for which it was designed.

All switching should be done with oil switches having interconnected poles where practicable, since serious interference to parallel telephone lines is experienced by switching operations if all poles are not operated at the same instant of time.

Special attention must be given to charging lightning arresters.

The parallel telephone lines should be built and maintained in the best possible manner, although their condition cannot affect the power lines while many conditions on the power lines may render any parallel telephone circuit useless.

CONCLUSION.

The most comforting condition met in considering inductive interference, its seriousness, its causes and remedies, is that all interference can be avoided by a suitable separation of the lines. This is the one sure cure and in many instances it costs nothing.

When a situation exists that makes a condition of parallelism absolutely necessary, the expected interference may be avoided or reduced to a negligible quantity by the application of some or all of the following preventatives:

Use properly designed power apparatus; make the parallel as short as possible; and make the separation between the lines as great as possible.

In the case of a three-phase line, arrange the power wires in the form of a delta. Transpose the power wires throughout the length of the parallel in any case, and throughout the entire length of the transmission line if practicable. The transpositions in the power line should co-ordinate with the transpositions in the telephone lines.

Use high grade power insulators. Keep the lines free from grounds. Balance the power circuits carefully. Study proposed transformer connections. Balance the telephone lines.

While there are many means available for reducing inductive interference—and it must be conceded that when all the cures are liberally applied to lines operating under *ideal conditions,* substantial interference can be avoided—we must remember that under any abnormal condition such as often occurs, the lines so treated will be noisy, their efficiency reduced, and the revenue derived therefrom reduced or stopped.

Since telephone lines can operate satisfactorily when paralleled by high power transmission lines, only, when all conditions are ideal, we should realize the necessity of avoiding parallelisms whenever possible.

The power and telephone utilities should study each other's problems. Each should know how its operations affect the other and, in the interests of good service to the public, neither utility should construct nor operate its plant in such a way as to interfere with the other.

With a large measure of co-operation and an attempt on the part of both utilities to avoid the known causes of interference, we will find ample room on the highways of the country for both classes of service and neither need suffer any inconvenience.

Remember, adequate separation between the lines is the only sure preventative against interference in telephone lines from parallel power lines.

Successful Operators' Meeting Held at Bloomington, Ill.

On Wednesday and Thursday, December 13 and 14 an operators' conference and school was held at Bloomington, Ill., under the auspices of the McLean County Independent Telephone Association. B. F. Baker, the efficient secretary of the Illinois Independent Telephone Association has the honor of being president of the McLean County Independent Telephone Association.

During the two days there were about one hundred operators in attendance from McLean and adjacent counties. Tom C. Ainsworth, manager of the Kinloch-Bloomington Telephone Co., of Bloomington, was host to the visitors and entertained them at luncheon both days of the conference and at a dance on the first evening.

W. S. Vivian, secretary-treasurer of the United States Independent Telephone Association took charge the first day of the meeting and spent the greater part of the day in reviewing and familiarizing those who were present, with the new standard long distance operating rule book of the association which has been adopted generally throughout the country. By means of three demonstration switchboards, the rules were demonstrated by the operators at actual practice.

The second day of the meeting was in charge of C. E. Doolittle, traffic manager of the Citizens' Independent Telephone Co., of Terre Haute, Ind., the same interests owning the Kinloch-Bloomington Telephone Co., at Bloomington.

This is one of a number of schools that are to be held in the near future in different sections of the country.

Consolidation of Telephone Systems in Brazil, South America.

The president of the Republic of Brazil, South America, has permitted the Interurban Telephone Co. of Brazil and the Companhia Rede Telephonica Bragantina to join their lines along the frontiers of the states of Sao Paulo and Rio de Janeiro and the federal district of the republic at whatever points these junctions may be found necessary, and the companies may proceed to exploit the new system thus created under the provisions of article 99 of Law No. 3089 of January 8, 1916. The consolidated company will be known as the Rio de Janiero & Sao Paulo Telephone Co., Ltd.

The system in Sao Paulo has been operated by the Companhia Telephonica do Estado de Sao Paulo, which is a branch of the Canadian Rio de Janiero Tramway, Light & Power Co. of that city, and the Companhia Rede Telephonica Bragantina. The former of these companies was said some time ago to have 8,000 subscribers in Sao Paulo, Santos, and Campos alone. The Companhia Rede Telephonica Bragantina, with headquarters in the city of Sao Paulo, serves nearly 5,000 subscribers and connects 171 cities and towns in the states of Minas Geraes and Sao Paulo.

The Brazilian Traction Co., which owns the entire capital stock of the new Rio de Janiero & Sao Paulo Traction Co., Ltd., is offering in New York a $7,500,000 three-year 6 per cent, secured gold note issue, at 99 and interest to net about 6⅝ per cent. Alex. MacKenzie, president of the company, stated that the whole of the proceeds of the loan were to be used for the replacement of advances on capital account in connection with the acquisition of important telephone systems in Brazil, owned by the company, with the exception of $2,600,000, which was being applied to the construction of trunk lines and the extension of the telephone systems. The $7,500,000 of notes just sold are secured by the bonds of the telephone company.

Convention of the Kansas Association Held This Week.

The annual convention of the Kansas Independent Telephone Association was held on Tuesday, Wednesday and Thursday of this week, December 19-21, at the National Hotel, in Topeka. The first day's program included addresses and reports of officers, and the appointment of committees. On the second day an operators' school was held, as were also sessions on engineering and accounting. The features of the last day's session included discussions on rates, reports and several addresses, followed by a business session.

Quiz Questions on The Preceding Installment.

145. What is the origin of the letterhead? State its purpose.

146. What are the essentials of a letterhead?

147. Discuss the letterheads shown in Figs. 112 and 113.

148. What is characteristic of those illustrated in Fig. 114?

CHAPTER XIV. Business Stationery (Concluded).

149. *Letterheads with Illustrations.*—More characteristic letterheads are reproduced in Figs. 116 and 117, all of which contain some special illustrative features. That of the LaCrosse Telephone Co., for instance, shows a grouping of the name and Independent Shield which required a drawing and a special printing plate. This particular letterhead is very successful, as it contains just enough detail and decorative features to make it harmonious. The grouping of the various items is very well done.

The letterhead of the Leaf River & Egan Mutual Telephone Co. is also a successful study in more extensive decoration. It is well balanced and attractive.

The letterheads of the Nappanee Telephone Co. and the Adair Telephone Co., shown in Fig. 118, are somewhat more complicated. Yet there is no doubt about the kind of business that these letterheads represent. The writer believes that the Nappanee letterhead would have been better if the ornamented panel containing the name of the town had been omitted, as this seems to draw attention from the name of the company, which is, after all, more important on a letterhead than the location of the company.

Prize letterheads which were designed

Fig. 116. Characteristic Letterheads of Telephone Companies Which Are of an Illustrative Nature.

DIRECTORS
H. LINTON REBER, PRESIDENT AND GEN. MGR
HENRY NICOLAUS, VICE-PRESIDENT.
WM. R. ORTHWEIN, VICE-PRES. AND COUNSEL.
WM. H. BASSETT, SECRETARY.
MURRAY CARLETON.
EDW. A. FAUST.
BRECKINRIDGE JONES.
SAM. M. KENNARD.
WM. J. LEMP.
WM. H. NOLKER.
FRED. C. ORTHWEIN.
JULIUS S. WALSH.
ROLLA WELLS.

ADDRESS ALL COMMUNICATIONS TO THE COMPANY.

KINLOCH TELEPHONE COMPANY,

KINLOCH BUILDING.

CAPITAL STOCK, $5,000,000.

H. G. FADELEY, TREASURER.

ST. LOUIS, MO.

C. S. GIBBENS, President — LAWRENCE DECK, Treasurer — B. L. JESSUP, Secretary

THE P. A. & P. TELEPHONE CO.

"LOOK FOR THE SHIELD"

Abbyville, Kansas,—

The Telephone of QUALITY. QUANTITY. POPULARITY

EXECUTIVE OFFICES
OF

KINLOCH-BLOOMINGTON TELEPHONE CO.
BLOOMINGTON, ILL.

WABASH VALLEY TELEPHONE CO.
PARIS, ILL.

CITIZENS INDEPENDENT TELEPHONE CO.
TERRE HAUTE, IND.

120 SOUTH SEVENTH STREET

TERRE HAUTE, INDIANA

OFFICERS
I. H. MOULTON, PRESIDENT
F. P. HIXON, VICE-PRESIDENT
W. F. GOODRICH, SEC'Y, TREAS. & MGR.
J. M. STORKERSON, SUPERINTENDENT
E. J. CONWAY, CONTRACT AGENT

LA CROSSE TELEPHONE COMPANY.

"THE NEW PHONE"

DIRECTORS
I. H. MOULTON — F. P. HIXON
GEO. H. GORDON — L. C. COLMAN
W. F. GOODRICH

INCORPORATED 1893

TELEPHONE BUILDING FIFTH AND JAY STS.

LA CROSSE, WIS.

JAMES G. HUNT, PRES. — G. W. SEAMAN, SEC'Y AND MGR. — JNO. M. SHERMAN, TREAS.

The Fremont Home Telephone Co.

FREMONT, OHIO.

EXCHANGES.
ANACORTES — DARRINGTON
ARLINGTON — DUVALL
BOTHELL — GRANITE FALLS
BURLINGTON — LA CONNER

C. C. HAGEMEYER, PRESIDENT
CLIFFORD WILEY, VICE-PRES.

PUGET SOUND INDEPENDENT TELEPHONE CO.

GENERAL OFFICES:
EVERETT

J. M. WINSLOW, GENERAL MANAGER

EXCHANGES:
MARYSVILLE — SEDRO WOOLLEY
MONROE — SNOHOMISH
MOUNT VERNON — STANWOOD
TOLT — VASHON

L. J. THALLER, SUPERINTENDENT
G. P. ELWORTHY AUDITOR

Fig. 117. Some Characteristic Letterheads of Independent Telephone Companies.

and entered in a recently conducted competition are shown in Figs. 119 and 120. They are not telephone letterheads, but they may serve to give ideas of what clean-cut composition can do in the way of producing a distinctive letter heading.

As examples of the possibilities of type only, notice the dignity and character expressed in the examples shown in Fig. 119. These are the highest examples of the printer's art as applied to commercial correspondence paper.

The letterhead of the New York Edison Co. is one of a series used by that company, all of which embody the same style of cartoon illustration. As an example of how good humor can be injected into a letterheading, this specimen is very much worth while. It makes one feel rather good-natured to look at it, and this is a good frame of mind to get people in when they read your letters.

150. *General Rules for Letterheads.*—There are a few general rules to be observed in regard to the preparation of business letterheads. In the first place, the name of the firm should certainly be stated exactly as it is desired that it appear before the public. The public looks upon the letterhead as the court of last resort when it comes to knowing the exact name of the company or of any of its officers. The full address should always be stated in order that replies may be received without any delay.

In the case of telephone companies which give the locations of the various exchanges, it is many times difficult to know from which exchange the letter is sent. This should always be definitely stated. The letterhead of the Ohio State Telephone Co. shown in Fig. 112 indicates one way this can be accomplished in the case of a company which has so many exchanges it is impossible even to list them on the letterhead. The city is written in on the typewriter at the same time the letter is typed.

151. *Paper and Envelopes.*—Naturally the correspondence paper should be of a size to fit the envelopes used, or perhaps this statement should be made the other way around, viz.: That the envelope should be of a size exactly to contain the paper when folded.

Most letterheads, as previously mentioned, are cut to size 8½ ins. by 11 ins., although a very attractive size can be

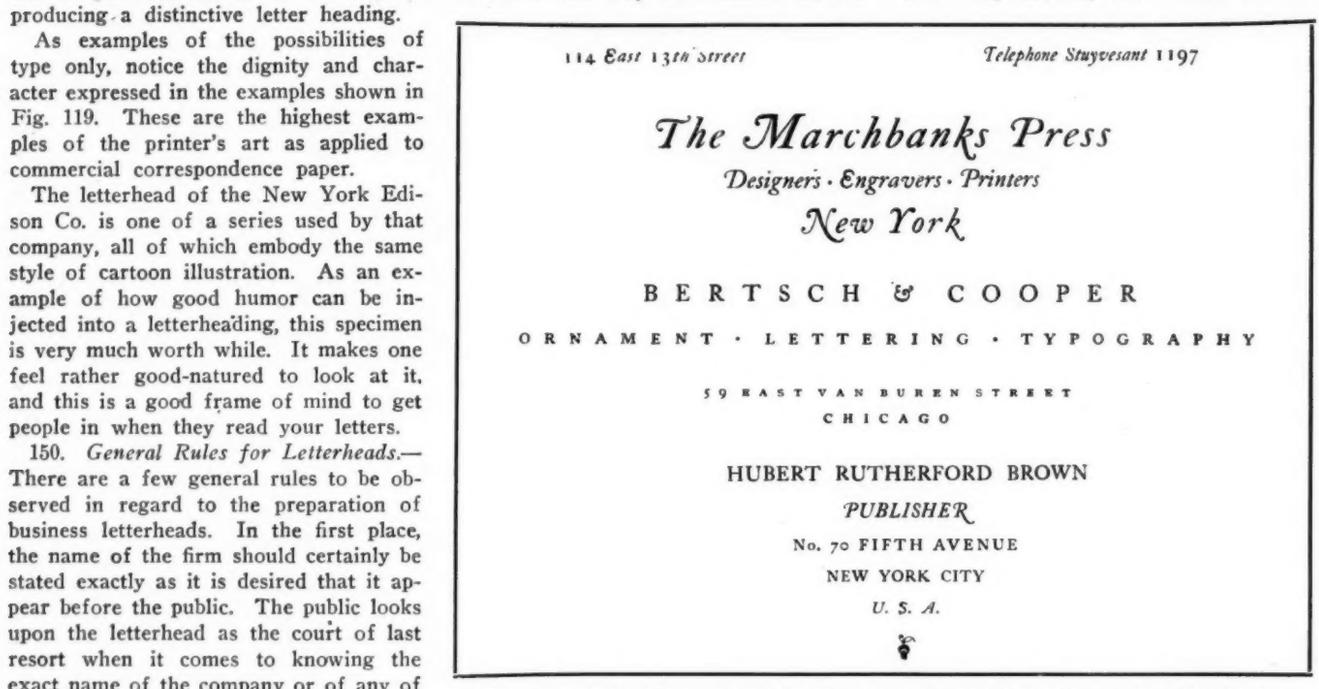


Fig. 119. Highest Examples of Printers' Art as Applied to Commercial Letterheads.

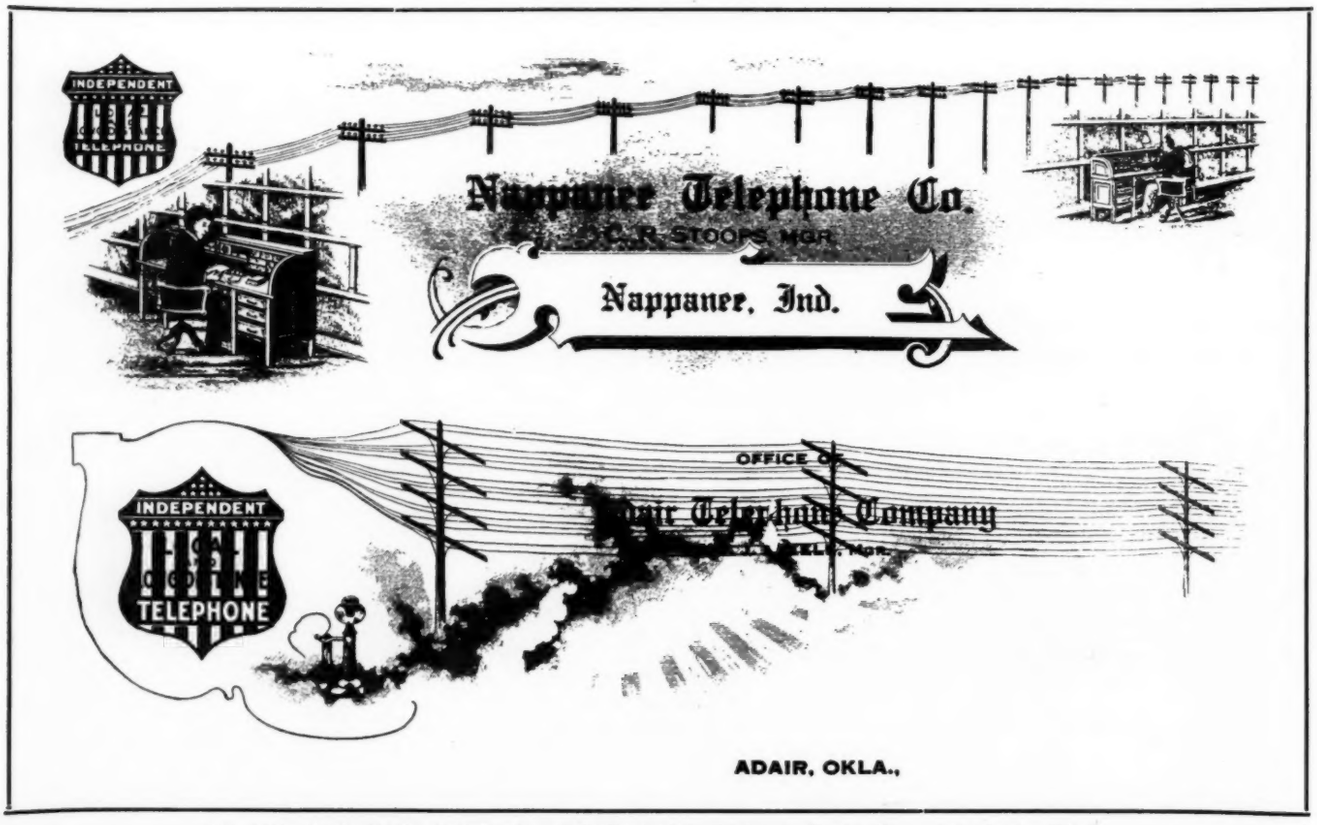


Fig. 118. Letterheads Which Clearly Indicate the Business of the Companies Using Them.

secured by cutting it 7¼ ins. by 11 ins. This is what is called the two-fold size, and is used with an envelope measuring 3⅞ ins. by 7½ ins.

There seems to be a tendency on the part of many business men to use a size No. 10 envelope instead of the regular No. 6¾ size. The No. 6¾ size necessitates folding the letterhead in three folds, while the No. 10 permits the letterhead to be folded only twice, which means that the letter when opened presents a more attractive appearance and looks more important.

152. *Use of Colored Paper.*—It is seldom that colored paper is used to good advantage in letterheads. Usually the effect, unless handled with extreme

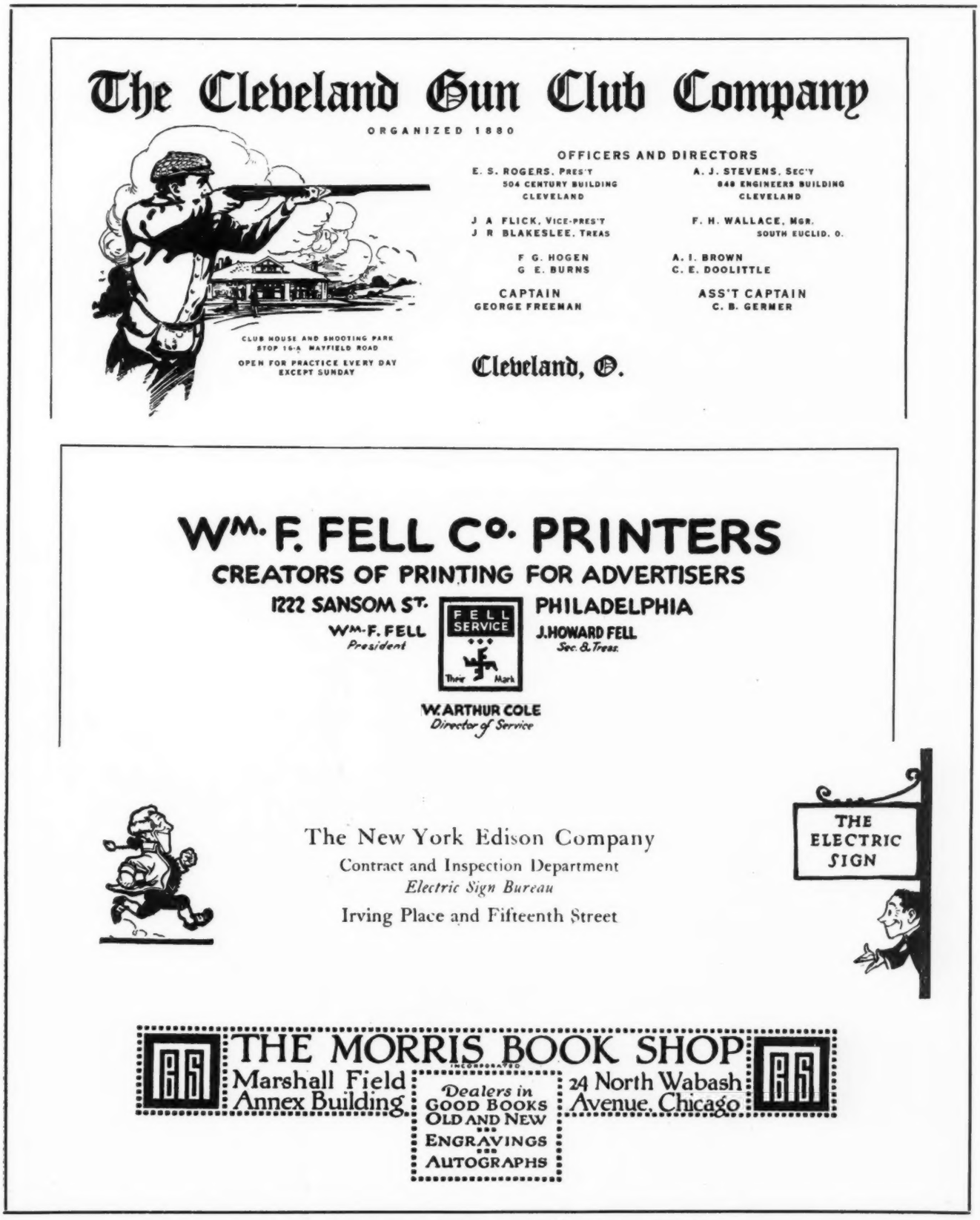


Fig. 120. Illustrated Letterheads Entered in a Prize Competition.

care, is rather glaring. If there is any doubt at all as to what color of paper to use in getting up a letterhead, always use white. White is always in good taste and works up well.

Carefully selected colors can be used to emphasize certain important points and to add a little life to the stationery. Tinted paper stock can sometimes be used to produce very striking effects but they must be executed by a master printer in order to produce something worth while. Gold or silver effects on business stationery usually get one into trouble. They are hard to read and expensive to run. Their use should be limited exclusively to polite forms of social correspondence paper.

153. *The Paper Stock and Second Sheet of Letters.*—In selecting a paper stock from which letterheads will be run, be sure to choose a paper which will be serviceable both on a typewriter and with pen and ink. It should have sufficient body to fold well and to open up well. A flimsy letterhead seems to suggest a flimsy company. Above all things, a letterhead should be practical. It is a means of conducting correspondence and anything in the way of artistic beauty that is put into it is of secondary importance to practicability.

The method of producing letterheads by means of printing, engraving, embossing, and lithographing are usually so well known that comment is needless. Each method is a specialized trade in itself and seldom, indeed, can a stationer be found who could handle all of them.

Where a letter is more than one page long and carries over to a second sheet, this second sheet should not be a letterhead. It should be a blank sheet of paper of the same quality as the letterhead, or a sheet which bears at the top a line providing space for the name of the addressee together with the number of the page. In this case, if the second sheet becomes separated from the letterhead, such a notation will serve to show where it belongs. This is a convenience many times appreciated by the people to whom one is writing.

(To be concluded.)

How to Advance Rates

Our Rights—A Paper Read Before the Kansas Convention

By J. C. Kelsey

While the telephone company is not guaranteed a profit, it is guaranteed by both federal and state constitutions the opportunity to earn a fair profit over and above the cost of furnishing the service to the public.

The supreme court in the Minnesota rate case said, "What the company is entitled to demand, in order that it may have just compensation, is a fair return upon the reasonable value of the property at the time it is being used by the public." Just pause a moment and let the words sink deep into your mind: "What the company is entitled to demand."

Here you have a clear expression of your rights before the law. In the first place, you are told that you have a right to demand something, and further you have been told exactly what you can demand—simply a profit.

Not a business man in your town has any other ambition in the world except the opportunity to earn a fair profit over and above the cost of furnishing his output to the public. And during these war time days what merchant in your town has not taken advantage of his constitutional opportunity by raising his prices so that he could earn a fair profit over and above the cost of conducting it?

Your telephone company has property rights. Property is that name applied to something which cannot be taken from you without due process of law. It means the same thing at all times.

It is not conceivable that property of Kansas people shall be thought to be one thing when devoted to public use and an utterly different thing when devoted exclusively to private use.

No citizen who devotes his property to public use loses any element of its rights or values. The property of your company is a part of the commercial enterprise of the state and is private property of the company as much as the personal belongings of its employes.

We all realize that our government is preparing to regulate all property which forms a part of interstate commerce. Both private and public property will fall under the same control and it cannot be imagined that such governmental acts will eliminate any of the elements which make up the present value of such property.

The creation of a state regulatory body has not changed the character of your property, nor did it create any new rights or take any away. The rights of your company and its obligations governing ownership and rights have remained the same as they were under common law.

The only purpose of the public utility act in creating the public utility commission was to provide the machinery by which means the obligations imposed under the common law could be enforced.

At all times prior to the creation of your commission, the courts had jurisdiction in the practices of your company. Since your commission has been created, the jurisdiction of the court has not been abolished; and if you feel aggrieved at some decision of the commission you can still appeal to the courts for a review of the distasteful decision.

As a matter of fact, commissions are intended only as referee in a rough and ready court. They save time by the elimination of technicalities.

They are supposed to weigh the facts brought out in a dispute between the public and a public utility. They are supposed to arrive at conclusions a great deal as King Solomon did when he ordered the baby cut into two and divided between the contending mothers.

They have no real right to give decisions based on personal opinions, prejudices or political necessity, but must act upon the actual weight of the facts regarding the respective rights of the contestants.

Oligarchies are going to be less popular in America than ever before. The world is growing sick of mandatory things; it prefers arbitration to force every time.

The position of a telephone company is not a complex one. It only asks to receive enough gross income to pay all operating expenses, maintain the property at an efficient level, set aside a reserve fund to meet rainy days—as all sensible individuals do—and have enough left to pay the investor properly and regularly for the use of his money.

No merchant in your town ever asked for less; no investor in a bank, or mine, or farm was less modest, and no individual has any credit in the city who does less.

Surely no man, woman or half-grown child can find an inscrutable mystery in a demand for enough income to meet the demands of ordinary business?

There is another feature which comes into play in this question for adequate compensation. If one of your citizens, who invested $1,000 in your property and has never received a dividend, is asked to buy more stock in your company to pay for extensions, what is he likely to say?

It is well known that no telephone property ever stands still—it is never a completed property. Commissions and courts have the right to compel you to extend to meet the needs of the public. And how can you finance the needs of this command unless your stockholders can see a profit on the additional investment offered?

A telephone company must receive sufficient income to pay all expenses, provide for depreciation and dividends, in order that the credit of your company will be firmly established so that it can always, by a ready sale of its securities, secure the money needed each year to meet the demands of the public for increased service.

Your patrons are always changing. To secure your present subscription list of 1,000, you have had to install between two and three thousand telephones. Suppose you refuse to serve any subscriber except your original list. How many would you have and what would the people say who could not get the service?

To give the people service costs money, and it comes only from the sale of securities. Sale of securities is only possible when the credit of the security is established by long payment of proper dividends. Dividends can only be paid after expenses of operation, upkeep and perpetuation are paid. A proper gross income is the father of it all.

In a recent rate case, a group of business men appeared before the commission with a view of asking a lowering of the rates of the local company which charged those famous and traditional rates of $2 and $1.

The company had fifty-two thousand real dollars invested and was striving as most all do, to give a proper service to a fairly thrifty community. Residence and farm collections were slow and in order to quicken the collection of its monthly dollar, the company asked permission to add a quarter a month to the rate of those who did not pay by the 15th.

The city arose in its wrath, wasted hundreds of dollars on "committee meetings" and decided to retaliate by asking a sweeping reduction from the $2 and $1 rates.

At the hearing I gleaned that the salary of the leading objector, a lumberman, was $200 per month and that the others ranged lower but not less than $150. On the other hand, the telephone manager got $100, the directors got nothing, and the treasurer did his work for $10. The lumber company had $15,000 invested, and it soon developed that the telephone company was the biggest corporation of them all.

With these facts in my possession, I advised my client to dismiss his petition, which caused great victorious grins on the other side.

But these grins soon subsided. We notified the gentlemen that a new petition would be filed for a real rate advance which would have as a feature, not only a fair depreciation rate but a raise of salary to the telephone manager to $175 per month, the treasurer to $25 and every director to receive $5 for every meeting he attended.

I further impressed them that it was not the telephone company which paid these salaries but the public itself and it could not expect a man, because he was a telephone man, to receive less than a lumberman or any other salaried man of the community.

The telephone man, especially skilled in an intricate industry, has a right to draw as much salary as the highest paid man in the community. No public utility commissioner or court has any right or authority to compel any telephone man to work for less money than his neighbors in private life.

I heard of a commissioner who once told a telephone man that he should do the work for $50. It was all he was worth, he said. I have never heard of a public utility commissioner who refused to take his salary and I keep pretty close tab at least on the sensational features of our business.

We have recently had a decision which denied the manager the right to a salary because he happened to be the owner. The man in question is as good a telephone man as I know, and he works 24 hours a day instead of the shorter time which hired men work for.

Such a decision is silly and unworthy and will not stand in court for a moment. Every telephone man is worthy of his hire and no opinion or prejudice of any commissioner is worth the paper it is written on. In plain language, it is none of his business.

For a great many years, one of our manufacturers had a rate-raising policy for telephone men who needed new equipment. Its salesmen would circulate a petition to every telephone subscriber, stating the hopes of the company to buy modern equipment and asking each subscriber to agree to a raise in rate so that the improvements could be made.

In every case, no difficulty was met with on an agreement of a 50-cent business raise and a 25-cent residence raise. If there was disagreement or refusal, the company would keep on using the old apparatus and the blame would be upon the bold salesman's shoulders.

The best thing of the year on rate-raising was the address of W. B. Gregson, of New Philadelphia, before the Ohio convention. It gives us the typical condition.

"From the inception of our company in 1900 up to the fall of 1906," Mr. Gregson states, "we sold our service for $24 per annum, business, and $12 per annum, residence on private circuits. In addition free service was given between all of our six exchanges covering about 150 circuit miles of toll lines.

"After these six years of operation it was found that the income of the property was not sufficient to maintain itself and provide for its fixed charges. Moreover, it stood face to face with the problem of a large amount of reconstruction work. The financing of the reconstruction work was finally arranged for and, when completed, an adjustment of rates was *guessed* at which yielded the company $30 for a private line; $24 for a four-party line, business; $18 for a private line and $12 for a four-party line, residence.

Things went along in the usual way. Business kept on increasing, but financial conditions seemed not to have been remedied. In due time our service began to receive severe criticism. After careful analysis by personal calls upon a goodly number of our subscribers, the trouble was found to be due to congested toll lines on account of the free service.

Our next step was to find out the extent of the use of our toll lines. This was done by keeping a careful record of all calls for seven consecutive days with the following result: 16,404 free messages, an average of 2,343 per day; 89 paid messages, an average of 12 per day; and 4,625 cases of 'line busy,' an average of 661 per day.

When I made this report to our directors it did not take them long to see the necessary remedy, which resulted in eliminating the free county traffic. This action naturally resulted in some sharp discussions, but we contended that toll property should be maintained from toll revenue and exchange property from exchange revenue.

Our next experience was the adjustment of rates in our two principal exchanges, New Philadelphia and Dover. These are in one exchange area with about 3,200 stations and represent 72 per cent. of our entire subscription. This adjustment was effected October 1 this year. The rates now in effect are: Business, one-party, $36, and two-party, $30; residence, one party, $24, two-party, $21, and four-party, $15. These rates are net.

Before filing this schedule of rates we decided that our subscribers had a right to know why we should have an increase, and that this knowledge should be based upon facts. Therefore, we immediately got busy and compiled a careful study of the property involved, setting up plant

valuation, operating and fixed charge expenses, revenue under the old rates and estimated revenue under the proposed rates.

After this had been completed in detail, and every figure supported by facts, we started our campaign of education. Our first move in this direction was to lay the matter squarely before our chamber of commerce and various other business organizations, following this up with intelligent newspaper articles. We also were very careful to answer all personal inquiries as completely as possible.

With this method of handling the public, we sustained a loss of 46 stations, which have practically all been recovered, and I feel quite certain that the users of our service have more confidence in our institution now than they had in the past.

"I do not wish to convey the idea to you that we accomplished anything wonderful in this bit of work—far be it from so—but I do wish to leave a few suggestions with those who are interested in suggestions:

Get better acquainted with the property which you represent. Be sure that every policy which you inject into your business is perfectly fair, both to your patrons and your company. Make no statements except those which you know to be absolutely true and supported by facts. Induce the patrons of your company to have confidence in you as a man and do not betray them."

Mr. Gregson states it better than I can. Get acquainted with your property and be fair and honest to both patrons and stockholders. All the telephone business needs today is a frank statement of what it is entitled to demand—a fair return upon the reasonable value of your property at the time it is being used by the public.

If you come forward and state the facts, the public will ungrudgingly agree to your law-given opportunity to earn a fair profit over and above the cost of furnishing the service. As my lumberman said: "If it is true that the employes of this company are underpaid, and the company is not perpetuating itself, we will be the last group of men in town to oppose your new rate application."

The law prohibiting you from growing too fat in purse, naturally and mutually offers you opportunity and encouragement to prevent your purse from shrinking to leanness.

MORAL: An eye for an eye, and a tooth for a tooth.

Earnings of the Keystone Telephone Co. for November.

The Keystone Telephone Co., of Philadelphia, Pa., has issued its comparative statement of earnings for the combined companies for the month ended November 30, 1916, and for the 11 months ended on that date, as follows:

	For month ended Nov. 30, 1916.	Year previous.
Gross earnings	$125,634	$116,148
Operating expenses and taxes	63,761	59,766
Net earnings	61,873	56,382
Less interest charges.	27,683	27,536
Net surplus	$ 34,190	$ 28,846
	For 11 months ended Nov. 30, 1916.	Year previous.
Gross earnings	$1,337,152	$1,245,419
Operating expenses and taxes	675,513	622,391
Net earnings	661,639	623,028
Less interest charges	302,229	293,860
Net surplus	$ 359,410	$ 329,168

Meeting of Morgan County, Ind., Operators and Managers.

The first meeting of the Independent telephone operators and managers of Morgan county, Ind.—planned and arranged by Manager Fred Preston, of the Martinsville (Ind.) Telephone Co.—was a decided success. All the operators in the county were present, with the exception of those at work on the switchboards, the meeting being held at the Carnegie Library on Tuesday, November 28.

The address of welcome was made by Mr. Preston, who said that the purpose of the meeting was to get together and get acquainted. All of the girls had probably made acquaintances by telephone but many of them had never before had the opportunity of meeting one another in person. The personal acquaintance and friendships made, it is believed, will aid materially in securing better co-operation in the conduct of the telephone business in the county.

M. F. Hosea, of Indianapolis, traffic manager of the Indianapolis Telephone Co., gave a talk on the handling of long distance calls, also assuring the managers present that the Martinsville Telephone Co. and the Indianapolis Telephone Co. would be more than pleased to assist them in any way possible in handling their business and that they may feel at liberty to call upon either of these companies for assistance at any time.

Miss Kathryn Demmerly, of Indianapolis, instructed the operators in the systematizing of long distance calls.

"Co-operation" was the subject of a talk made by Frank Welch, of the Martinsville Telephone Co., which was well received by his audience.

The Martinsville company was the host at a banquet at the Colonial Hotel at 7 p. m., followed by a theater party.

The meeting was pronounced a most successful one and it was the desire of all present to repeat the meeting next year.

Those in attendance were: M. F. Hosea, traffic manager, Indianapolis Telephone Co.; Miss Kathryn Demmerly, chief operator and Mrs. Emma Bronson, Indianapolis; Mr. and Mrs. E. N. Milhon, Mrs. Jesse Haynes and Miss Grace Bayliss, Mooresville; Mr. and Mrs. Sylvester Hoadley, Miss Hazel Wampler and Miss Ruth Miller, Gosport; Mr. and Mrs. A. Carroll, Cope; M. J. M. Dilley, the Misses Edna Scott, Flora Baker, Marie McKinley, Marie Norman, Cora Bain, Mr. and Mrs. Fred Preston, Lester Green and Frank Walch, all of Martinsville; Mrs. Everett Knoy and Miss Ella Armstrong, of Monrovia, Ind.

First Get-Together Meeting of Morgan County, Ind., Operators and Managers.

The Kellogg Switchboard & Supply Co., of Chicago, sent souvenir gold plated pins embossed with a telephone design and the Indianapolis Telephone Co. sent souvenir pencils.

Long Distance Operating Rules

Book Issued by United States Independent Telephone Association Gives Independent Telephone Companies the Benefit of the Most Economical and Effective System of Operation of Toll Lines—Applicable to Small Offices

By W. S. Vivian

Mr. Manager: Your attention for just a moment, please!

Accompanying this article you will see a facsimile of our book of long distance operating practices. With reference to this book we call your attention to the following:

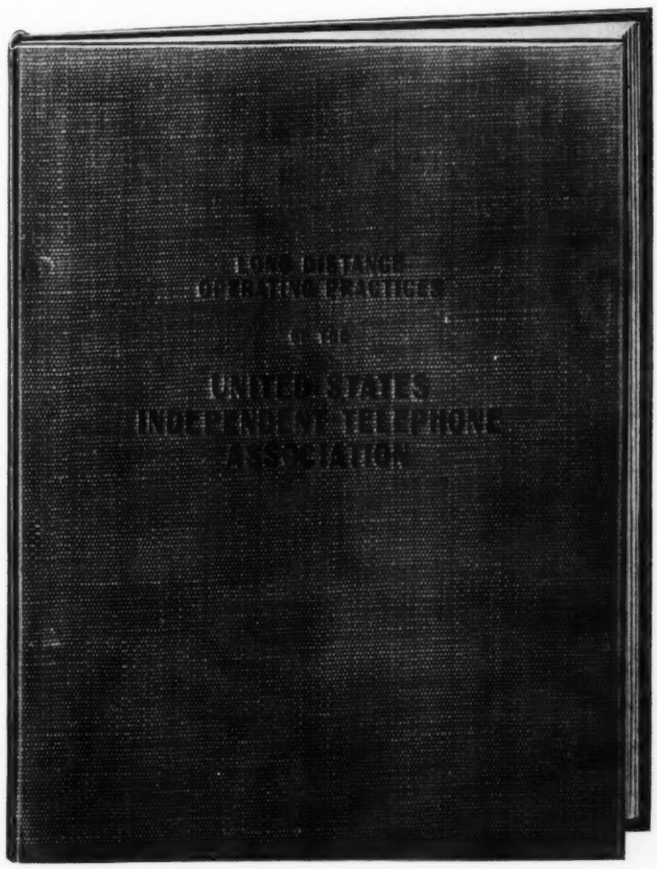
This volume of long distance operating rules (practices) is issued by the United States Independent Telephone Association for the purpose of giving the Independent telephone companies the benefit of the most economical and most effective system of operation of toll lines which committees of the association have been able to find or devise, and so far as practicable of establishing uniformity. A similar rule book of the Ohio State Telephone Co. was used as a basis.

Some of the benefits of uniformity are in the saving of much time of operators and of circuits, and in making the service more prompt and attractive to the public, thereby bringing to the company more business and the ability to handle it with the utmost economy of facilities.

The rules may well be introduced by schools of inspiration and instruction. When operators, who are frequently dealing with one another over the wires, are brought together in person, and, particularly in meetings, they get a much better sense of the system of which they are a part, and of their relations with one another, with the company, and with the public. They can be inspired to work with much better harmony and consideration and to learn to apply better judgment to their own particular conditions.

General instructions in such schools may well be followed with individual and detailed instructions. The influence, partly conscious and partly unconscious, upon uninstructed operators of those better informed and consistently using good practice, will be helpful and rapid. Nothing, however, will take the place of careful, continued instruction and study. The system aims to establish practical responsibility for all acts and omissions, with usually a secondary check, or responsibility to prevent failure in the serving of the public.

It is fair to say that too few directors and managers of telephone companies have realized the importance and possibilities of the toll operators' work, because such operators, on their own initiative of learning and practice, have so well developed individual effective methods. There is lack of appreciation of what can be done by systematic training and co-operation. Attention to this subject and adoption of good rules have brought many companies large financial returns and much public favor.



A Product of the United States Independent Telephone Association.

The book is not too bulky for the use of small offices, for a study of its contents will show that a large portion will meet their needs.

Some of the headings of the various sections of the book are: "Meaning of Terms Used in the Instructions," "Operating Methods," "Recording," "Line Operating," "Information Operators," "Ticket Operators," "Operating Practices," "Choice of Circuits and Equipment," "Expressions for Reports to Patrons," "Code Symbols and Their Interpretations," "The Supervisor," "The Chief Operator," "Building Circuits."

Between the direct instructions and the general expressions of purpose and policy are summarized the more important relations and duties of the individual operator as follows:

"Toward the person whose call she handles: To please him with prompt, polite service and the best quality of transmission that the plant affords.

Toward other operators with whom she deals directly: To give and take in good will and effectiveness.

Toward the beginner, who has so much to learn of people and things, of method and tact: To set examples of patience and of accomplishment.

Toward supervisors and chief operators: To help them carry their responsibility for the interwoven service and the multifarious demands of the public.

Toward the patrons and operators whose calls are waiting to get on the lines she occupies: To regard their desires and rights equally with her own.

Toward the stranger to long distance service: To attract him to its regular use.

Toward the company: To co-operate with others in practicing the brief methods that increase the capacity of the lines; to persevere in the completion of all calls offered; to account for all earned revenue; and to help build up the traffic to the new capacity."

The association has ordered 2,000 copies of this book, of which approximately 1,500 copies have been sold.

The prices are: $1 in quantities of less than ten; $10 a dozen, with special prices in larger quantities. Because of the cost of these books, the association could not tie up a large amount of money in carrying a large stock; therefore, if you

have not already secured a copy for your company, or ordered one, we suggest that you order a copy for every office on your system at once. If the orders received warrant our printing a larger quantity of the books, it will be done.

Books have already been forwarded to companies operating in more than 30 states of the Union. This is but one of the direct benefits which accrue to Independent telephone companies because of the United States Independent Telephone Association. There is great value in united effort, and there is no question but that associated effort pays.

Operators' School Held at Fort Wayne, Ind.

On Thursday, December 14, local and long distance operators from northeastern Indiana, gathered at Fort Wayne, to receive operating instructions on the new standard long distance operating rule book of the United States Independent Telephone Association. The meeting was held under the auspices of the Northeastern Indiana Independent Telephone Association, of which organization Martin F. Umbach, traffic manager of the Home Telephone & Telegraph Co., Fort Wayne, is president.

The visiting operators and managers were the guests of the Home Telephone & Telegraph Co. at a luncheon at the Commercial Club.

Frank E. Bohn, secretary of the company and also the state association, opened the meeting and gave the visitors a warm and hearty welcome to the city. This address was in sharp contrast to the atmosphere outside the building, which was nearly zero. Mr. Bohn introduced Mr. Vivian, secretary-treasurer of the United States Independent Telephone Association, who immediately took charge of the meeting and reviewed the new book, demonstrated its worth by actual practice of the boards by means of the operators who were present. There seemed to be deep interest in the outline of the new book and a determination to master it.

Much progress is noted over the operating conditions as they were in that territory prior to three years ago.

Effort to Connect Apostle Islands in Lake Superior by Telephone.

C. A. Lamoreaux and John Chapple have recently returned to Ashland, Wis., from Washington, D. C., where they went to interest United States Senator Paul Husting and Congressman I. L. Lenroot in a plan to have the Apostle islands in Lake Superior connected by telephone.

"These gentlemen seemed to be heartily in favor of having the islands in the Apostle group connected up with the other islands and the mainland by telephone," Mr. Lamoreaux says: "This would be a splendid thing. The lighthouse keepers have no means of connection with the mainland, other than by boat. If telephones could be installed, in case of accident or any other trouble, assistance could be secured in a comparatively short time. No doubt such a thing will come to pass, and probably not far into the future."

The close proximity of the islands, one to the other, would not cause an unusually large expenditure in laying the cable for the telephones. Both Mr. Husting and Mr. Lenroot will use their influence in having this project attended to.

Through the efforts of James Bardon of Superior, a resolution recommending the establishment of a Harbor of Refuge in the Apostle group of islands in Lake Superior was passed. The island will be equipped with wireless telegraph and telephone as well as cable connection with the main shore. The harbor is to be planned so as to accommodate the navy of the nation if necessary.

There are 17 islands in the Apostle group, ranging in size from a few hundred acres to 14,000 acres.

Plans for Extensive Improvements by Ohio State in Dayton.

The expenditure of $200,000 by the Ohio State Telephone Co. for the establishment of four new exchanges in Dayton and the general betterment and extension of the city service was announced recently by A. W. Surrell, general manager of the Dayton district. Work will be started in a short time and the new improvements and additions are expected to be completed within a year. All local work will be under the supervision of Mr. Surrell.

New automatic branch exchanges will be established in the vicinity of Salem and Cottage Grove avenues, to take care of the company's business in Dayton View and Riverdale, north of Superior avenue and Helena street. Another will be established near West Fifth street and Western avenue for the West side; one for Ohmer Park and one for the West end. Equipment for all new exchanges will be of the latest automatic type, and each will be capable of handling between 2,500 and 3,000 subscribers.

Besides the establishment of the four new exchanges, 600 new cable pairs will be added to the equipment for the southern and eastern parts of the city and 600 pairs for North Dayton. Cables will also be extended to Edgemont, the East end and on all roads leading out of Dayton. New toll board and terminal equipment will be installed at the central office at Fourth and Jefferson streets. This improvement, Mr. Surrell stated, will cost approximately $15,000. Plans for all local improvements have been approved.

Fort Wayne Home Company Plans Enlarging Its Facilities.

Plans for enlarging the present facilities to care for its rapidly increasing business were discussed at the annual meeting of the stockholders of the Home Telephone & Telegraph Co., of Fort Wayne, Ind., held recently. If the tentative plans are carried out, an addition having a frontage of 44 ft. will be made to the present structure when the existing lease upon the property on Main street expires.

Reports made at the meeting indicated an increase of over 1,200 new subscribers during the year, making a total of 12,000 telephones in service.

Recently the company completed a fireproof warehouse on North Clinton street, which will be used as a regular shop in addition to affording storage facilities and a garage for housing the company's motor trucks.

It was shown by reports that the long distance business of the company made a heavy gain over the previous year.

The company plans during the coming year to retire all of its outstanding bond issues.

The board of directors and officers were re-elected as follows:

William L. Moellering, president; John B. Reuss, vice-president; Frank E. Bohn, secretary; Max B. Fisher, treasurer; A. E. C. Becker, W. A. Bohn, Henry R. Freeman, G. Max Hofmann, Isidor Lehman, auditors, H. H. Hartwig, Herman Freiburger and Henry F. Moellering.

Use of Telephone in Protection of Pennsylvania Forests.

Nearly 400 miles of telephone lines and 100 telephones have been installed by the state forest fire protection service, a branch of the state forestry department, on the forest reserves of Pennsylvania. The telephones are at the headquarters of the foresters and rangers of the state service so that immediate steps can be taken to organize for fighting fires in the woods. The service was tested out in a number of fires in Eastern Pennsylvania reservations last spring and more lines will be built this winter.

The telephone lines have been connected with observation towers on high points in the forest reserves and it is hoped to have a mile of line for each 700 acres. There is now one mile for each 3,500 acres. Foresters are supplied with portable instruments for cutting in on wires to report fires.

New Exchange in Detroit.

Work was recently commenced on the new Garfield exchange of the Michigan State Telephone Co., in Detroit. The building will be three stories high and when completed will have 3,500 subscribers' lines installed. The cost is estimated at $120,000.

"Telephony's" Home Study Course for Telephone Men

A Complete Presentation of the Principles Underlying Modern Telephony in All Its Branches—Arranged Systematically So That Regular Reading and Faithful Study Will Qualify Ambitious Men for Higher Positions—Prepared Under Supervision of Stanley R. Edwards—This Section Written by Jay G. Mitchell

Quiz Questions on the Preceding Installment.

556. State a great advantage of the electrolytic rectifier.

557. How does the electrolytic rectifier compare with the mercury arc rectifier as to electrical efficiency?

558. What is the principle underlying the synchronous motor mechanical rectifier?

559. How is the rectifier principle applied to the vibrator type?

560. What is the function of the electromagnet, 4, Fig. 177?

561. Is the mechanical rectifier using the vibrator mechanism, of high efficiency?

Practical Talks Just Among Ourselves.

In Fosterville the new storage battery had been in operation over one year. By careful attention to common-sense rules of operation the wire chief had prevented the occurrence of any battery trouble whatever.

Whenever the level of the electrolyte in the tanks had dropped to a point as low as one-fourth of an inch below the upper edge of the plates, the wire chief personally had filled them up with distilled water bought by the carboy from the storage battery company. He was also extremely careful each time to fill each tank to a point just exactly one-half of an inch above the upper edge of the plates.

While doing this he also took a reading of the difference of potential for each cell with a voltmeter having a low-reading scale with a range of from 0 to 5 volts. By using this instrument and making use of the narrow mirror behind its pointer, he was enabled to take the difference of potential of each cell very accurately, reading its value to within one one-hundredth of one volt.

This narrow mirror behind the pointer of the instrument had puzzled the wire chief for some time. By studying the arrangement carefully he had concluded that he could not tell for certain *what* it was for, but that whatever the instrument makers had intended, it was most useful to enable the observer to get the eye directly above the pointer. When the image of the pointer in the mirror is exactly behind the pointer itself, it *must* be true that the eye is directly above the pointer and the reading taken under these conditions must be the correct scale indication.

Being a methodical man, the wire chief preserved a permanent record of the readings of his voltmeter, associated with a record of the specific gravity readings for each cell. He had a hunch that a cell might begin to drop in voltage and specific gravity without attracting his attention, unless a careful permanent record of the readings were made each time. Any persistent variation, in the same direction, would at once be noted when the records were compared, and steps could be taken to insure its correction.

As a result of these methodical operations, the battery at Fosterville was in excellent condition, the plates were a rich chocolate brown color for the positives and the color of a wet slate for the negatives when fully charged. The company, on the wire chief's requisition, had also purchased a rod of cadmium with which the capacity of the two sets of plates in each cell was periodically tested.

As the usual thing, the wire chief had always taken the distilled water carboy from the stockroom himself and placed it in the storage battery room, in readiness for tank filling day. It happened, however, that a serious case of switchboard trouble required his presence at Smithville on the day that was usually devoted, in part, to the inspection and care of the storage batteries.

The wire chief had taken great pains to instruct the main-frame man in the work of the entire office including the care of the storage batteries. When he was called to Smithville, therefore, it was understood that the batteries would have their usual care but that the main-frame man would do the work instead of the wire chief himself.

The carboy of distilled water in the battery room was found to be only partially full and after filling two tanks, it was necessary to bring another one from the stockroom. Now there was a partial carboy of *red acid*, for Fuller batteries, in the stockroom, a relic of the old days when the company's equipment was of a more primitive pattern and when red acid cells were used as the source of current for the operators' sets.

The stockkeeper knew about this partial carboy of red acid but the main-frame man did not. Being accustomed to make out his own requisitions and to fill them himself—a bad practice by the way—the main-frame man wrote out one for one carboy of distilled water and proceeded to fill it by taking the old carboy of *red acid* upstairs to the battery room.

When the carboy had been set in place in the cradle for easy pouring, a cable splicer called in and asked that 25 pairs be shifted from one cable to another. This had to be done at once as the 25 pairs to be relieved were badly needed on South street.

Now the main-frame man had always insisted on doing all the jumper work himself—a very good idea by the way. In the present instance one bad idea and one good idea produced one very bad result. Being certain that he would be engaged upon the work of changing over the 25 pairs of jumpers for some time, the main-frame man asked one of the linemen to fill the tanks with distilled water from the carboy in the battery room. He told him that the tanks should be filled until the electrolyte or solution was about one-half inch deep over the upper edge of the plates.

The new lineman, being an ambitious young fellow whose subscription to TELEPHONY had been sent in but had not been in long enough to place the paper in his hands, went to work with a will and soon had the tanks filled as instructed. When he had finished, he casually remarked that the color of that stuff in the carboy was a beautiful rich red. When the main-frame man sensed the full significance of the remark without taking time to look in the battery room, he telephoned for a rush delivery of enough new electrolyte to fill all the tanks.

This is because a very little red acid is very destructive to lead-lead storage battery plates. In the present case it was necessary that it be removed from the tanks *at once*.

He started the mercury arc rectifier and commenced to siphon all the liquid out of the tanks into the sewer with the garden hose. While this was being done he started the lineman to bridging 2 mf. condensers in parallel on the main battery terminals.

From a fresh barrel of dry cells, he took enough to make six sets of 16 cells,

per set. Connected in series of 16, the six sets were placed in parallel with the condensers across the main battery circuit to the switchboard The rectifier was now floating on the battery, the load, the con-

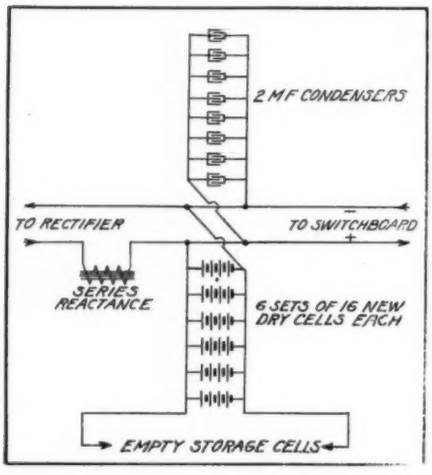


Fig. 178. Emergency Operation of Rectifier.

densers and the bridged six sets of dry cells.

When the liquid was all out of the tanks, they were flushed freely with water and, one at a time, the plates in each cell were carefully and thoroughly washed to remove from the active material the final traces, so far as possible, of all the red acid. Had there been more than one set of battery, it would not have been necessary to empty the tanks unless both sets had been affected by the error of the lineman and main-frame man.

By adopting the arrangement outlined, which is shown in Fig. 178, the main-frame man was able to operate the office with power from the mercury arc rectifier directly with very little annoyance due to noise on the lines. When the fresh electrolyte arrived, it was a very simple matter to fill the tanks anew. Owing to the prompt emergency measures taken the plates did not suffer serious injury.

The wire chief gently pointed out the *two bad ideas* and it is thought that all concerned profited from the unfortunate series of errors.

CHAPTER XXIII. Power Plant Equipment (Continued).

562. *The charging generator.*—In many exchanges the charging current for the batteries is obtained from some form of direct current generator or dynamo-electric machine. Any direct current dynamo *may* be used for battery charging provided it has the requisite output capacity at the proper voltage. Electrical efficiency, as well as the necessity of preserving a perfect control of the charging *rate* dictate the use, preferably, of shunt-wound dynamos for this purpose.

Charging dynamos are sometimes compound wound, although there is no advantage in the compound winding for storage battery charging. The writer has made use, at various times, of all sorts of shunt-wound dynamos for battery charging with the happiest results.

563. *Conditions required for battery charging efficiency.*—When the charging dynamo is likely to be used in charging a battery on which the load is being floated, it is the best present practice to install a multipolar generator—that is, a generator having more than two poles. The iron frame of a four-pole multipolar dynamo is represented in Fig. 179.

Machines of this type for this class of service are equipped with a large size commutator having a great number of segments and armature coils. The large number of commutator segments and armature coils and special arrangements at the ends of the pole pieces next the armature serve to prevent strong high frequency fluctuations in the charging current such as would affect the common battery and make the connected lines noisy.

Were it not for this provision, there would be a possibility of the normal high frequency current fluctuations causing a humming noise similar to the noise produced on telephone lines connected to a battery which is being charged from a mercury arc rectifier. In fact, the use of an impedance or reactance coil of low ohmic resistance is sometimes necessary when the battery is to be charged from a direct current generator of regular design as well as when it is to be charged from a mercury arc rectifier.

564. *Objectionable features of the dynamotor for battery charging.*—The so-called dynamotor, in which both the generator and motor armature windings are placed upon one armature core and in which only one set of field magnets and

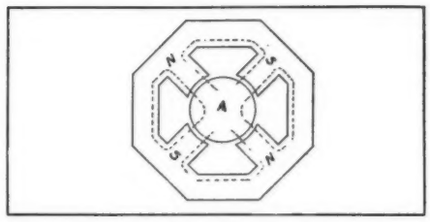


Fig. 179. Magnetic Circuit of the Four-Pole Dynamo.

a floating battery by means of the dynamotor, it is somewhat inefficient because of the impossibility of varying the field current independently of the motor armature current. In other words, the regulation of such a machine requires the insertion of an adjustable resistance in series, preferably with the power circuit so that the voltage impressed upon the motor side, both fields and armature, is varied as the value of the resistance is varied.

The armature current in any shunt motor is, of course, many times stronger than the current required to excite its fields. It is obvious, therefore, that the resistance for regulating the dynamotor output must have a much larger current-carrying capacity than it would be required to have when designed to regulate field exciting current only. Also it is obvious that the amount of energy dissipated in heat by the adjustable regulating resistance is much greater, in such an arrangement, than it would be in the case of the small capacity rheostat inserted in the field circuit of the ordinary shunt machine.

For a review of the subject of the rela-

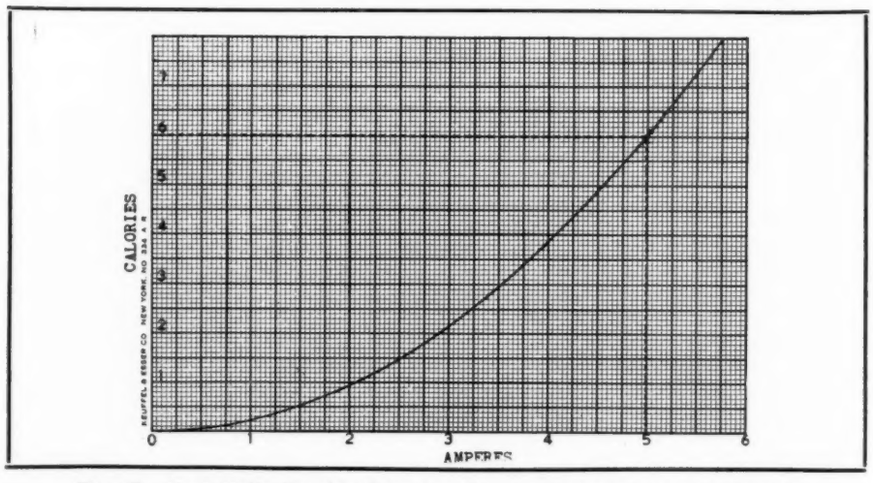


Fig. 67. Heat Units Developed by One Ohm of Resistance in One Second.

field coils are used, is not suitable, ordinarily, for charging a floating telephone battery. The reason for this is found in the fact that the high frequency fluctuations likely to occur on the power circuit are certain to be repeated from one set of armature coils into the other. This is because they have a common core and act as repeating coil windings.

In addition to the difficulty of charging

tion of the current strength in a given circuit, the resistance through which this current is passing, and the heat units liberated, the reader should see sections 168 and 169, Chapter VII, TELEPHONY's

Home Study Course for Telephone Men, TELEPHONY, August 21, 1915.

From the curve shown in Fig. 67 it is apparent that the number of heat units developed in any given resistance in a given time is dependent upon the strength of the current flowing through it. Since the energy dissipated in the form of heat is wasted in the dynamotor series rheostat, the electrical efficiency of the dynamotor is apt to be low. This is because it requires that a comparatively large current be passed through the controlling rheostat with resultant large loss.

For these reasons and similar ones inherent in the general design and method of operation, the dynamotor for this service is not considered to be in accord with the most advanced practice.

In the early common-battery exchanges in which four different battery voltages were employed in the operation of the equipment and in which the matter of floating the storage battery on the load owing to the variation of voltage in charging was not considered practicable, machines of this type were employed. Present practice requires not only equipment permitting the floating of the battery on the load when charging, but also the greatest possible electrical efficiency in the entire power plant.

(To Be Continued.)

Practical Subjects—Discussions

Sunshine and Shadow Along the Telephone Trail.

By Well Clay.

If you hope to keep advancing,
The surest way, you'll find,
Is to grease the wheels of labor
With the product of the mind.

This is a very doubtful verse, but it conveys the idea in a very few words. A telephone man has to "hop to it," to use the slang expression, and keep going if he is to long grace the situation with his presence.

The latest in our "neck of the woods," to keep us from too sound slumber nights, is the trouble that has come in the wake of the transmission lines for electric power, which just at present are being built in all directions.

To the manager who has "grounded lines" which run parallel to the power company's lines, comes a disagreeable shock as soon as the "juice" is turned on, whether he comes in personal contact with the power wires or not. He rushes to the telephone, frantically calls up the power company's office, and, perhaps, orders the "juice" shut off immediately, for the reason that it is putting his lines out of commission completely.

If you suppose the power company gets at all excited, you guess wrong for, strange to relate, those in charge not only refuse to get excited about the matter but usually tell the excited manager that they are not particularly interested in whether his lines are affected or not.

"But," the manager proceeds, "you have put my lines practically out of commission. What am I to do?"

The power company herein asks the usual question as to whether the telephone manager's lines are "metallic" or "grounded." The manager answers, "grounded," as the power company's manager knows he will, being perfectly well aware of the situation which would develop from the very first. The irate manager is then softly informed that, if he takes the pains to make all of his telephone lines full metallic, he will cure the trouble with which he is being afflicted.

"Who's to pay for all this?" demands the telephone man.

The reply is that the power company not only can not answer the question, but is not interested in learning the answer.

The telephone man reasons thus:

"My lines were all right until the power company's induced current put them on the bum. Therefore it is up to it to make me whole in the matter." This he reiterates to the power man, who says:

"We have built an up-to-the-minute line for the transmission of power for this and other communities and we have built it according to the very best engineering practices obtainable. If your lines have not been built according to the best specifications which can be obtained and, being therefore inferior to what they should be, we are not to blame for the predicament in which you find yourself."

"But," you retort, "I will admit that my lines, while not being constructed according to the latest accepted specifications under which, we will say, the Western Union Telegraph Co. builds its lines, or the A. T. & T. Co. its toll lines, yet they were built to fit the needs of this community and were the best that the prices which the community would pay for service would allow. Therefore, I am in the right."

The manager asks you if all your lines are affected and you, answering, "No, only the grounded lines," thereby fall into a trap. .

"How does it come then, if you say you have built your lines the best you could for the money, that for some farmers you have built metallic lines and for other groups only grounded circuits?"

"You are discriminating between your customers and are thereby technically breaking the law, if not actually."

"The reason for this," you reply, if you think of it, "is that some groups of patrons are located close to town and are quite near together, so they can all be reached with a small expenditure of line cost while others are far apart and all of them a long ways from town. They were told and accepted the conditions under which they could receive service before we built to them. Therefore we still maintain that, in justice to us as public servants, who have built our houses on the best locations that were available without having the option to choose as to whether we preferred the rock foundation or the sandy soil, we should be protected in our present position.

"Not that we should expect the power companies to quit business, but to the extent of putting our lines in order where we can operate in proximity to their circuits and have the power companies partially reimburse us for the added expense, or loss, or whatever we call it. We do not expect that they will pay the whole shot, for that would be unfair in that our lines would be better and worth more after the change than before."

If the power company is really desirous of being fair and is willing to do by others what it would expect from others were the conditions reversed, it will probably go over the matter with you, when you get together somewhere. The chances then are that you and the other czar will finally compromise and agree on a course which will be fair to both.

This is merely one of the many new and perplexing problems which are raising their hideous heads above the calm and untroubled waters of the rural telephone business over which we have been been sailing all these years.

Whether we could go into court with a case of this kind and stand any chance of recovering damages, I do not know. But I feel satisfied that, as I have heard expressed by others, the best way for you as a telephone manager to do, when confronted with the prospects of having a hydroelectric line built into the neighborhood, which you soon will have if not already, is to go to the manager or promoting end of the power organization, lay your cards down on the table and do the very best you can with him in a give and take deal.

I do not say that he will give you much or little, but if he is a good business man and is broad-minded, he will be apt to deal fairly with you, if you are reasonable in your demands.

After that, what will you do to make up the difference between what you had originally intended to invest in the line-

and the amount which you now find that you must earn money on if you would pay dividends on your stock? There seems to be only one way, as it is a sure thing that you must invest more—not to better the service, but to keep what you have already—in order that you may collect at all.

The lines must be put in order and an application made to the commission which rules over your destinies, to allow you to raise your rates.

In which manner will the public pay for the loss or improvement, depending on whether they are looking at the telephone end of the matter or whether they are considering the added advantages of having light and heat in the form of electricity at their command?

Will they allow the power company to charge a larger rate per kilowatt in order that it may pay the full costs of installing its plant in the community, including the damages done to telephone companies? Or will it hold the light company to a reasonable rate for the direct service and allow the telephone company to collect on a basis of what the service costs, after allowing for all legitimate expense?

Will the public be willing to allow the man who put his savings into telephone stock in order that he might have a prop for his old age to reap the benefit therefrom? Or will the public say that after the margin between what such a plant could be reproduced for today—with the aid of all that is known of the science of building—and the amount which it originally cost, added to the patchwork later to bring it up to somewhere near standard, is deducted, there would be nothing left worth while? Will the public be broad-minded enough to realize that in allowing the costs for experimentation and improvement, it will only be doing the fair thing and encouraging not only those who have already invested money but also both the inventor and the capitalist in further investments and improvements?

APHORISM: Foresight is merely guesswork, and hindsight is only a rudder.

Use of Idler Poles to Keep Sleet Off Wires.

Unusual difficulties in the operation of telephone and telegraph pole lines have been experienced on the Denver & Salt Lake since its construction across the Continental Divide, just west of Denver, according to an article in the Railway Signal Engineers prepared from data furnished by C. A. Parker, of Denver and Salt Lake.

In addition to the snow, which is frequently piled up to a depth of 40 ft. by the rotary plows, frequent sleet storms are experienced, which leave large deposits of ice on the wires and poles. A thickness of 3 ins. of ice on the wires is not at all unusual, making it almost impossible to build a pole line which will support this weight.

The greatest difficulty is experienced about three miles beyond Corona on the Continental Divide, where the line turns at right angles to the prevailing direction of the wind. At this point the line consists of four wires, two telegraph, one through telephone, and one local telephone for blocking between watchmen. When the line was first built, 45 poles were used to the mile. Later this number was doubled, but it was found to do little good, as it only resulted in holding the poles up longer, allowing the wires to catch more ice.

The line was operated one winter with the wires on the ground partially or wholly covered with snow. No trouble was experienced while the snow stayed on, but in the spring it was necessary to string new wires in order to get them working on the poles again.

A solution of this difficulty was finally found in the use of an idler pole in the middle of each span. The supporting poles are placed about 60 ft. apart, so that the idler pole is about 30 ft. from each end of the span. The main poles are 25 ft. long with a 4-in. top, cut off 3½ ft. and set 3½ ft. in the ground, making the wires about 18 ft. above the ground. The idler poles have a single cross arm located from 4 to 6 ins. below the wires and not connected to them in any way. The wind keeps the wires in motion enough to strike this cross arm and shake off the ice as fast as it forms.

In order to reinforce the wires at the supporting poles where breakages are most common, tie wires 30 to 36 ins. long are used on each wire connecting to the insulator and extending out along the wire. No strain guys are used on the poles, as they make the line too rigid and tend to increase the number of breakages.

The use of these idler poles has eliminated 117 out of 120 breaks per year for the last three years. It is hoped that upon the completion of the proposed tunnel under the Continental Divide, a new pole line can be built over the summit parallel with the tunnel location which will make it practically parallel with the direction of the wind and will thereby eliminate most of the difficulties mentioned.

Shooting Trouble on Line of the Forest Reserve.

In northern Idaho is located the "last big belt of white pine." The government forest reserves enclose a large area in this territory. Within the reserves the foresters are at work all summer taking care of fires, building trails and telephone lines. Outside the reserves lies the field of operations of the Timber Protective Associations—associations of the state and timber owners against fire.

The cause of timber fires is usually lightning, sometimes vacationists. The "fire season" is the dry spell between the spring dampness and the fall rains, opening as late as May or June on account of heavy snowfall. This is illustrated by the yarn about the newcomer asking the old-timer why the large chimney on his cabin. To which he replied that it was not the chimney but his winter-time front door.

The most noticeable of the protective measures are numerous posters asking the camper to remember the lives and property imperiled and be careful with his camp-fires, matches and tobacco; also that one tree will make a million matches, but one match may destroy a million trees. Then there are a series of lookouts on high and favorable locations where are stationed through the fire season the lookout men and rangers.

The practice of the associations is to employ two experienced woodsmen for each lookout station. This station consists of cabin, bunkhouse for extra help, watchtower, and if practicable a barn and pasture.

The boys who inhabit the station are nicknamed "smoke chasers." They "go into action" when an electric storm plays hide and seek around the hills. A sharp watch is kept from the towers and a compass used in "spotting the hits." A lightning flash is usually followed by a column of smoke ascending from the tree which has been hit, perhaps later bursting into flame.

With their intimate knowledge of the country and a close reading on the compass, the men will make a very accurate estimate of the distance to and location of the fire. After the storm has passed, they may have notations on from two to thirty hits. The smoke chaser takes his compass, shoulders an axe, pick and shovel and is off through the jungle to the fire. If possible the fire is smothered with earth—if a tree is burning it must be chopped down. When help is required, it means a trip to the telephone.

The lookouts are connected by telephone, which brings us to the point of human interest. I believe the government is still using the heliograph at a few points, but is rapidly getting telephone connection to these.

A ground circuit with No. 9 iron wire is used, the wire being suspended by split tree insulators from trees or poles near the trail. These tree insulators are dignified by the name of insulator only on the invoices, being called "hickeys" by the men who handle them.

At the stations are protectors, five-bar, 2,500-ohm telephones, and extension bells and switches as needed. The government uses some additional equipment.

Rangers carry a portable aluminum set designed by the forestry engineers. It resembles a common battery test set with an additional tube along the handle to contain a cylindrical flashlight battery, near the receiver. Convenient to the figures are talking and ringing buttons. The talking-button connects the set as standard local battery telephone. The ringing-button connects the battery to the primary through a make-and-break contact operated by the core of the coil and the secondary throws the induced tone to the line, the receiver being shunted. This tone is received at certain stations by "howlers" bridged across the line.

The howler is a 2,000-ohm ring-magnet receiver with base and binding posts and a small megaphone attachment. It is connected in series with the condenser in the telephone.

The service is seriously disturbed at times by static electricity, attributed to the altitude. In the morning the transmission is generally very clear.

During August one of these associations wanted to borrow a man for a week to visit its stations and perform the desired sleight-of-hand. I was told later that the manager had no personal grudge when he selected me.

Imagine an undersized trouble-shooter astride a cayuse for the first time. Tied to the saddle are belt, spurs, axe, hand coil and blowtorch. The main highway is a trail, the right-of-way cut through the timber six to ten feet wide, the foot-path worn, dug, or blasted as occasion requires.

For five or six miles the trail winds along the side hills on firm soil while the wire follows a natural meadow or marsh where it is free from falling timber. Flowing through the meadows is a clear, cold stream which is crossed and recrossed on bridges consisting of four logs laid parallel, the center logs being hewed flat. Even in August, the thirsty traveler can get a refreshing drink of ice water right out of the creek at any crossing.

Farther on the country is rougher, the trail winding about the steep timbered slopes till at last it climbs a big, bare hill. The surrounding country spreads out at one's feet and all that stuff. Anyway the lookout men can see hills and valleys of pine trees—can watch their territory as you would look at this page.

The line we were following runs 12 miles from the headquarters' station to the top of this hill. Here are switches for connecting the other two legs. The first is 14 miles with two stations. It is not usually left connected. The second is 30 miles with a five-mile spur, having three stations.

The station at the top of the hill was unable to ring the other stations properly. After testing the telephone, of course, the ground connections received first attention. Each of the three lines had its ground, one was a pick buried in a foot of loose mud, another was an axe-head buried to a like depth in similar mud.

When all the wire on the place had been buried in the heaviest soil to be found and that soil cussed out because it wasn't better, the rings were said to come in fair at the other end but not strong like the rings they received from the prairie country in the opposite direction.

We then strapped our grounds together and found that a ring on one line would "kick back" and tinkle the extension bell on another line. Then followed more discussion of the soil and rock formations, one of the lookout men maintaining that the hill was hollow because he could hear a horse so far, the other assuming an attitude of "let him rave."

From this hill it is ten miles down to the river—some of it downhill and some straight down—then a ford where the current is pretty swift and the horses swim it except at low water mark (where it was in August, for which we were truly thankful). Thence four miles along the rocky cliffs above a flashing river to another ford. Here was a messenger stretched across the stream and you might ride over in the basket and not get your feet wet. On the other bank was a snug little cabin, the next station. The fishing was good, thank you, but can you bake your own biscuits? I can't, yet.

After this came more hill-climbing and more loose soil and poor grounds. What would you offer as sufficient ground connection on such a hill?

I think one of the boys had the right idea. He had buried about a thousand feet of No. 9 wire just below the spring. He could ring the other stations pretty well, too. We had no chance to find out if it would "kick back" like the others.

The one hundred odd miles round-trip used up six days and it almost seemed we had been somewhere. The map said we had been part way across the county—the width of it. It is a fine country only there is too blamed much of it.

The Trouble Shooter.

Head of Business College on Value of the Telephone.

Following a lecture on the use of the telephone, at Steward's Business College, Baltimore, Md., according to the Transmitter, Frank C. Steward, president of the school, said to the students:

"When you finish your course at the school, be sure to leave your telephone number on file with us, so that we can reach you immediately. When a business man decides he wants a stenographer, for instance, he wants that stenographer right away. He telephones to us to send one around. If we can reach you by telephone, we can get you on the way in five minutes. If we have to write you, the chances of your getting the position are decreased, as he may get someone else in the meantime."

Cable Under Housatonic River.

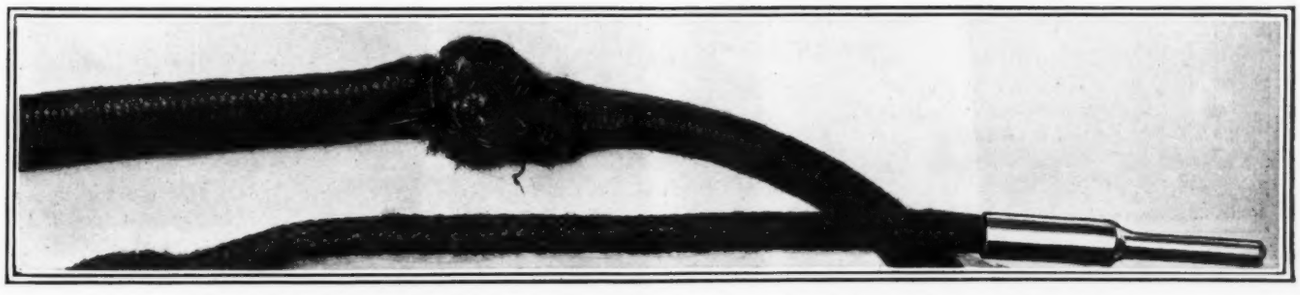
A 2,000-ft. cable is being laid under the Housatonic river from Stratford to Devon, Conn., by the Southern New England Telephone Co. as a part of its new underground system between New York and Boston. The cable is 2½ ins. in diameter and weighs 2½ tons. It is composed of 400 pairs of wire.

A Neat Job of Cord Repairing by a Rural Subscriber.

We had a rather amusing occurrence recently when one of our German patrons brought to us the cord from his receiver. He stated that it had been accidentally broken and that they had sewed it together. Still it wouldn't work so he thought it best to bring it to us for our examination and as evidence of his good intentions in trying to save us a trip to the country.

We are enclosing the cord so that you may see the good job of cord repairing.

The Williamsburg Telephone Co.
Williamsburg, Iowa.



Receiver Cord Broke, So Rural Subscriber Sewed Ends Together—It's a Nice Job of Sewing.

Automatic Cutover at Harrisburg

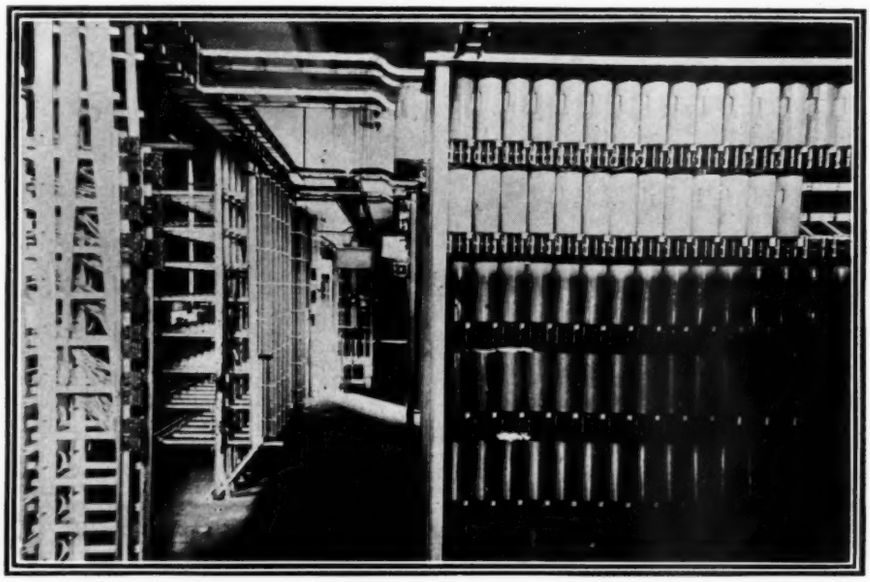
New Automatic System of Cumberland Valley Telephone Co., in Harrisburg, Pennsylvania, Cut Into Service December Ninth—Present Exchange Has 10,000 Lines Installed—Extensive Improvements Made to Outside Plant

Without a single hitch, the cutover from the manual to the new automatic system of the Cumberland Valley Telephone Co. of Pennsylvania in Harrisburg, Pa., was completed in less than five minutes at 10:30 Saturday evening, December 9. Harrisburg is now one of more than one hundred cities in the United States with automatic telephone service.

President Henry M. Tracy, in the presence of officials of the company and a number of representative citizens, put the first call through the new exchange at 10:30 p. m. Dialing the office of Mayor Ezra S. Meals, Mr. Tracy exchanged greetings and advised the mayor that the automatic system was in actual operation and that the company's officials hope it will be a prominent factor in making that city a bigger, greater and better Harrisburg.

In responding, the mayor congratulated the Cumberland Valley Telephone Co. and its officers and expressed the wish that the use of the automatic dial may more closely unite all of the citizens into one great homogeneous family.

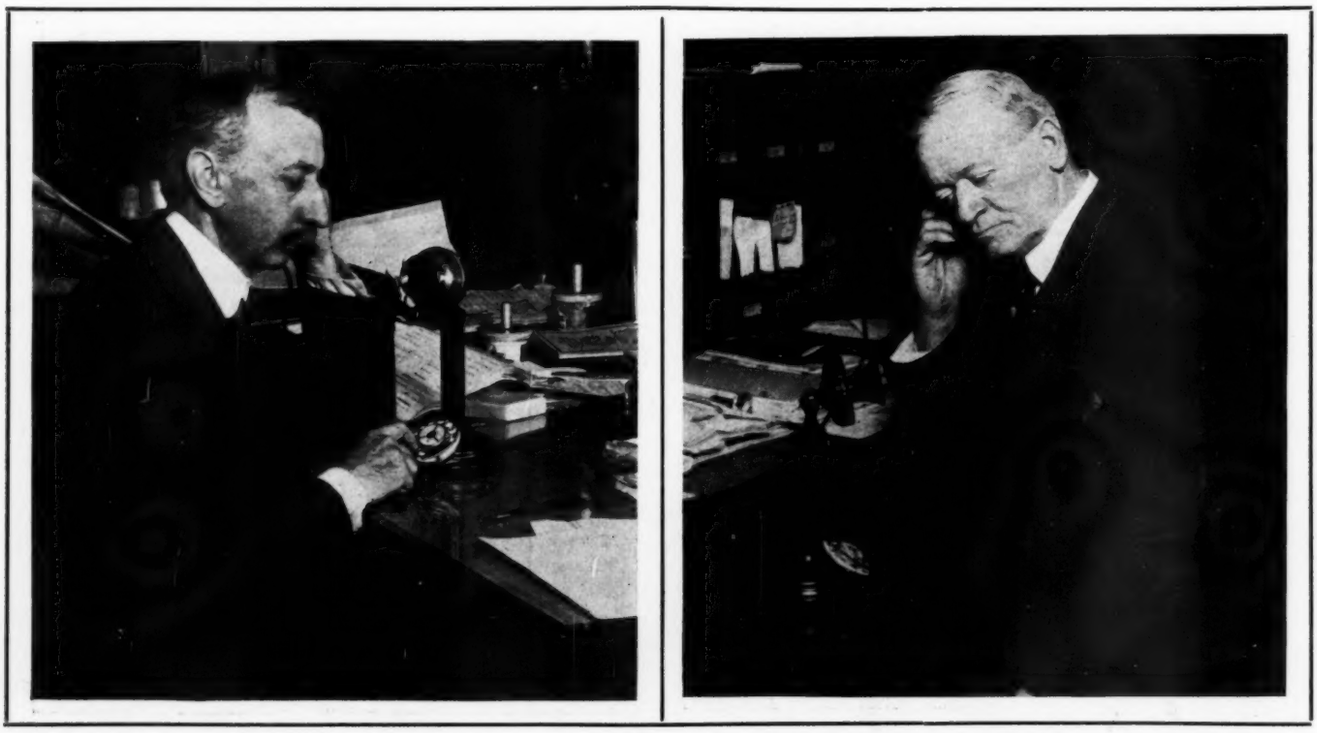
Following the conversation between the mayor and the president the new automatic exchange was thrown open to the public. Within a few moments hundreds of the Cumberland Valley's subscribers had discovered the old manual system was a thing of the past and soon the click of selectors and connectors completing connections was heard on the equipment.



View of Automatic Switch Room of Cumberland Valley Company.

A remarkable feature of the cutover from the engineering viewpoint was that only two cases of trouble were found after the cutover. These were present on the old manual system, but were not so easily detected as on the new.

Granville S. Herbert, engineer in charge of the cutover, was highly complimented by President Tracy for the efficiency with which his force handled the big job. Mr.



President H. M. Tracy, of the Cumberland Valley, Talking with Mayor Meals at 10:33 p. m., December 9—The First Call.

Herbert in an interview described the improvements made to both the inside and outside plant equipment during the last eight months.

"The inside plant," explained Mr. Herbert, "is the very latest type designed and installed by the Automatic Electric Co., of Chicago. It is the same type of apparatus that is in use in more than a hundred cities of the United States and adopted by nine foreign governments.

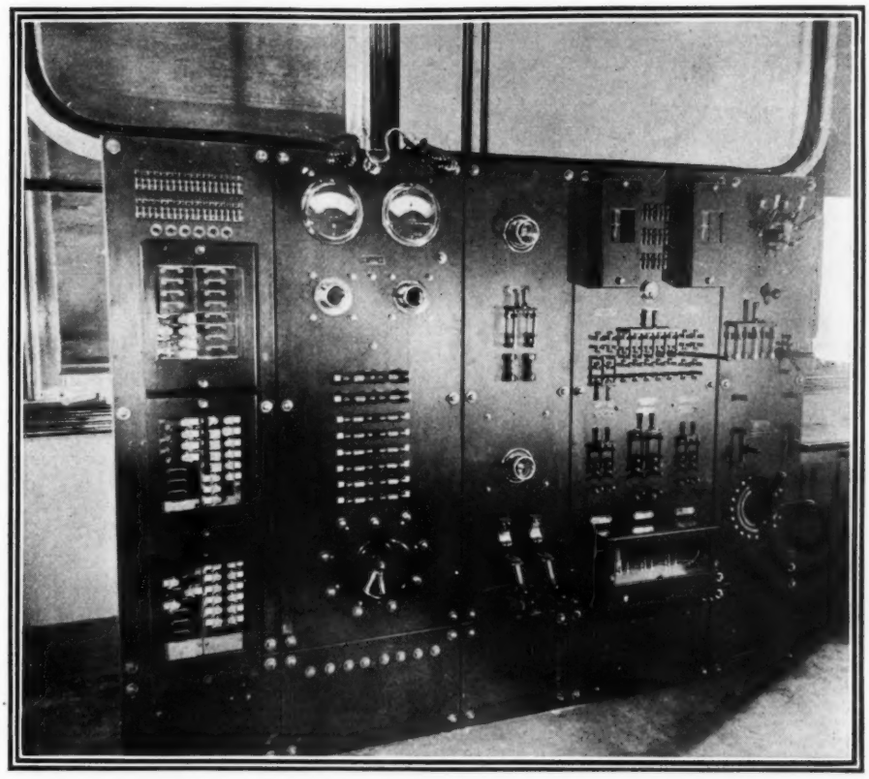
"The main exchange is designed to handle 10,000 lines and the equipment is so arranged that additional exchanges can be installed in other parts of the city, each having a capacity of 10,000 more lines.

"To handle the long distance business a new four-position toll board has been installed. This board was especially designed with the view to giving the very best possible transmission. It is also designed for automatic toll calling, which means that the Harrisburg operator by use of the dial can automatically switch through the various towns in making a connection to a distant point.

"New and modern testing, information and wire chief desks have also been installed.

"The main cable distributing frame is of the very latest type designed and marketed by the Automatic Electric Co. and is the latest word in this type of apparatus.

"To insure good transmission and service the Cumberland Valley Telephone Co. has spent more than $100,000 on the outside plant," continued Mr. Herbert. "Over ten miles of aerial cables have been cut into service and several miles of underground cable have been installed, together with special trunking cables for long distance service. An entire new cable has been put into service between the Harrisburg and Steelton exchanges. The entire outside plant has been carefully gone over and placed in first-class condition. The service to and from Steelton is the quickest known to the telephone art. With the use of the dial a connection can be completed between the city and the big mill town in six seconds. All details for giving the very best telephone service have been carefully worked out at an expense of thousands of dollars, but we believe it will be worth it to both the subscribers and the company."



Power Board of the Cumberland Valley Company at Harrisburg, Pa.

Home of Cumberland Valley Telephone Co., at Federal Square, Harrisburg.

Great interest has been evinced throughout the city at the plan of the Cumberland Valley company to replace its manual system with the automatic, because the Cumberland Valley is a home company and a great deal of local capital is invested therein.

The Cumberland Valley Telephone Co. was formed by a merger of five telephone companies in 1901 covering all the territory of the Cumberland Valley. The Harrisburg company which entered into the merger was the Dauphin County Telephone Co. Benjamin F. Meyers, after the merger and until 1907, was president of the company.

Shortly after the merger was formed the property was leased to the United Telephone & Telegraph Co., which operated it until 1907, when the Cumberland Valley and the United Telephone & Telegraph companies were both leased to the American Union Telephone Co.

Besides the five original companies which went into the merger the company

afterward acquired the Juniata & Susquehanna Telephone Co., the Lykens Telephone & Telegraph Co., and telephone properties in the states of Maryland, Virginia and West Virginia. The property now extends from Sunbury on the north, Lewistown on the west and goes south through Central Pennsylvania, taking in the towns of Mechanicsburg, Carlisle, Shippensburg, Hanover, Gettysburg, Chambersburg and thence through Maryland, West Virginia and Virginia, covering Hagerstown, Martinsville and Winchester.

The company operates 33 exchanges, has 600 miles of toll lines and 768,825 miles of line wire.

On January 1, 1912, the property was taken out of the hands of the American Union Telephone Co. and placed in the control of Henry M. Tracy, the present president, as receiver. At this time the property had become so depleted that its service was seriously impaired and the revenues so reduced and cost of operation increased that it barely earned operating expenses.

Through the efficient management of the receiver the property was reconstructed, the business built up, confidence of the public restored, and at the end of four years of the receivership Mr. Tracy had spent almost $200,000 from earnings of the company on reconstruction work, turning over the property to the new company free of any receivers' obligations and in excellent working condition. The toll lines had all been reconstructed, most of the lines rebuilt, new exchanges of a modern type installed at Mechanicsburg, Carlisle, Shippensburg, Gettysburg, Hagerstown and Martinsburg, together with a number of smaller exchanges at various points.

The automatic telephone was a hobby of the receiver and for the last two years of the receivership he was investigating its merits and strengthening the suburban districts of Harrisburg in order to make it essential and valuable to Harrisburg subscribers. He visited various cities in the West to get first-hand knowledge of the workings of the automatic telephone and its popularity among its patrons and was convinced of its merits.

It remained, however, for the directorate of the new company to authorize the expenditure of the large amount of capital required to install automatic equipment and new cable. This was taken care of in the plan for reorganization and after a thorough investigation by the board of directors the work was authorized.

The present directors of the company are William J. Lescure, Charles A. Kunkel, Henry M. Tracy, S. Will Skunkweiler, of Lewistown; F. A. Zimmerman, of Chambersburg; T. J. O'Neill, of Hanover; S. Wynne Foulkes and A. E. Prendergast. The late James Brady was also a director. His vacancy in the board has not yet been filled.

Efficiency and How to Become Efficient.

Stripped of all verbiage and psychological dissection, efficiency simply is *doing your work well,* is the answer given to the question—What is efficiency?—in the current issue of the Dupont Magazine.

Therefore, to be efficient, the article continues, one must first have a clear idea of his required duties and his optional extension of these duties.

These being known, it only remains to perform well the work for which you are paid, and in addition to take on as much more work as opportunity to serve your employer presents and your abilities can compass.

First. Ask your superior for a clear, comprehensive outline of the work he expects you to do and how he wants it done.

Second. Ask him further to suggest possible expansion of your activities along lines of value to him and calculated to increase your value to the concern.

Third. Lay out a written schedule of your expected and possible activities and record daily each completed performance, each omission, and, in your opinion, what percentage of efficiency you attained in any attempt to do a thing in which you did not wholly succeed.

Fourth. Strive daily to improve your performance, and to broaden your abilities and their application, crediting yourself with all sure progress and debiting yourself with all failures or partial failures.

Fifth. Make a monthly summary of your efficiency for your own study and comparison with past and future months.

Sixth. If the record fails to improve as a whole or in detail, go to your superior and ask his advice on how to overcome the obstacles that seem to block progress.

The system here suggested is an automatic one based on the principle that every earnest man is the best judge of his own efficiency.

He knows when he is tardy.

He knows when he is on time, yet wastes time before getting into action.

He knows when his mental or physical motor is running and consuming energy without being in gear.

This system makes every man his own handicapper and his own undodgeable censor.

The suggestion that appeal for advice be made to his superior is based on the fact that any intelligent employer thinks far more of the earnest striver for success, who recognizes his own shortcomings and sincerely seeks help, than the vainglorious braggart who assures himself and everyone else he is a world-beater in his line.

Try this system for six months and prepare for a surprise in the shape of promotion and increased pay.

Small Telephone System Ordered for Chungking, China.

The police headquarters at Chungking, China, recently received instructions from the co-director of military affairs of Szechuen province to establish a small telephone system to connect the various government offices and police stations in that city. This system is being established to facilitate the transaction of official business and is not intended for the use of the public. Fifty telephones have been ordered through a local firm from Shanghai. The instruments are said to be British and to cost 120 taels (about $87 United States currency), each. The service has been offered to the local consulates.

The regulations governing the installing of telephones prescribe that subscribers must deposit a cash bond of $50 Mexican (about $27 United States currency), which will be returned when the telephone is removed, and pay a monthly fee of $6 Mexican. The shortest term for which a telephone will be installed is six months. This system is under the management of the police headquarters at Chungking. It has been arranged between the police headquarters and the telegraph administration that in the event of a service for the use of the general public being established, this system will be purchased by that administration.

The installation and operation of telephone services is a government enterprise and is reserved to the Ministry of Communications.

The Highest Telephone Pole in the World.

Where the wires of the Pacific Telephone & Telegraph Co. cross the Chehalis river, near Aberdeen, Wash., is stationed the tallest telephone pole in the world, says The Telephone News. For some time a pole 90 ft. high was sufficient to keep the wires clear of the river craft. But the increasing passage of ocean steamers made a higher pole necessary, and a new one 126 ft. high was set up. This pole is one single stick of Washington fir, 18 ins. at the butt and eight ins. at the top. The pole weighs 6,000 pounds.

The stick was cut at a point 12 miles distant and towed down the river, where it was erected by 12 men using a 12-horsepower hoisting engine. For making attachments to the pole and raising it, a five-eighths steel cable was employed, run through ten-inch steel blocks. The pole was set 12 ft. in the ground and guyed with four steel-stranded wires at the top, and also guyed about 40 feet from the top with four-sixteenths-inch wires.

Personal Items from the Field

C. R. BLEAKNEY, who is well known in Independent telephone circles, has succeeded A. R. Snider as manager of the S. Morrison Telephone Co., of Greenfield, Ind. For a number of years Mr. Bleakney was manager of the Sidney Tele-

C. R. Bleakney.

phone Co., Sidney, Ohio, and on July 1, 1914, he accepted a position with the Williamsburg Telephone Co., Williamsburg, Iowa, and continued as manager until November 30, of this year.

Mr. Bleakney has been identified with the telephone business for some 16 years He received his first experience with the Zanesville (Ohio) Telephone & Telegraph Co. and the Central Union Telephone Co., as installer, troubleman, wire chief and manager. In 1905 he left the employ of the Central Union to accept the position of manager for the Sidney Telephone Co., with which company he remained until 1914, as previously stated.

With L. L. Layton, of Sidney, Mr. Bleakney invented the Hy-Po-Stat cable terminal. Mr. Bleakney has been active in state association affairs, having held the office of secretary of the Sixth District of the Ohio Independent Telephone Association for two successive terms.

His many friends in the Independent telephone field will be interested to learn of his new affiliations.

H. W. MARKS, local manager for the Iowa Telephone Co., at Murray, Iowa, has been transferred to the contract department of the Iowa Telephone Co., at Des Moines.

A. M. HARVILL, of Russellville, Ky., has been made local manager of the Cumberland Telephone & Telegraph Co. at Elizabethtown, Ky.

JOS. D. FRANK, of Dallas, Texas, has been appointed assistant general attorney for the Southwestern Telegraph & Telephone Co., with headquarters at Little Rock, Ark. The appointment is effective March 1, 1917.

R. L. HARRIS, who has been district commercial manager of the Nebraska Telephone Co. for the past five years, with headquarters at Deadwood, has been transferred to Grand Island, Neb., where he will act as division manager.

THOMAS H. BEESON, of Norfolk, Neb., has been transferred to Deadwood, Neb., as district commercial manager of the Nebraska Telephone Co.

W. H. HACKENJOS, of Donaldsonville, La., has been appointed manager of the Cumberland Telephone & Telegraph Co., at Ellisville, Miss.

THOMAS SIMPSON, for the past six years manager of the Bell Telephone Co. at Connellsville, Pa., has resigned to engage in the hardware business in Wilmerding.

W. G. RAUCH, superintendent of plant for the Cumberland Telephone & Telegraph Co., at Louisville, Ky., has been transferred to the engineering department at Atlanta, Ga.

LYNTON T. BLOCK, attorney and general manager of the Utilities Indemnity Exchange, of St. Louis, Mo., has accepted the invitation of the Minnesota Inde-

Lynton T. Block.

pendent Telephone Association, to deliver an address on workmen's compensation insurance at its annual convention, to be held at St. Paul, January 23-25.

ELIZABETH FARIS is the name of the young daughter of Mr. and Mrs. Harry N. Faris, of Kansas City, Mo. She was received into the family December 17.

C. E. V. DRAPER, organizer of the Mandan Telephone Co., of Manden, N. D., and president and general manager until last spring, was born in Phelps, N. Y.,

C. E. V. Draper.

October 18, 1855. At the age of eight years he moved to Marshalltown, Iowa, receiving his education in the grade and high schools of that city and also at the Iowa State University, where he received a B. L. degree.

Mr. Draper has been associated more or less with the telephone business since the invention of the telephone. He installed one of the first, if not the first, telephone exchanges known, in the 70's at Gilman, Iowa, when it was first discovered that sound waves could be conveyed over a thread of string line when properly constructed, using a tin can with a proper diaphragm end for the telephone. He was at that time telegraph operator at Gilman and connected up several residences, stores and the bank with central in the railroad depot. He later installed a telephone line in Marshalltown.

While manager for the Western Union Telegraph Co., at Bismarck, N. D. (1882-1883), Mr. Draper installed several acoustic telephones, using cotton covered wire. He also installed some regular "Crown" telephones for the government and a long distance line between Bismarck and Washburn.

He later secured the territory of Bismarck and Mandan from the Bell company. In a short time, however, he sold the rights and franchise back to the Bell company and installed exchanges in Bismarck and Mandan for the Bell, acting

as manager for both exchanges as well as the telegraph company. After a year or so he gave up these positions. Later, the rates being so high, most of the subscribers discontinued the service and both towns cancelled the franchises and ordered the poles removed.

The next few years Mr. Draper spent with the Western Union Telegraph Co. and the C. P. Telegraph Co. in Canada, during which time he installed quadruplex and duplex outfits. While with the Western Union he also connected up the electric arc search light on the steamer "Dakotah," the first arc light in Dakota territory.

In 1900 Mr. Draper organized the Mandan Telephone Co., at Mandan, N. D. In 1906 the company was reorganized and the exchange entirely remodeled, a common battery harmonic system being installed—then the only full harmonic exchange in the Northwest. The wires in all of the principal streets were cabled and entirely new instruments and switchboard equipment installed, in addition to new charging sets, storage batteries, harmonic ringers, etc., all in duplicate, making the finest exchange in the Northwest. Mr. Draper was president and general manager, as well as the largest stockholder of the Mandan Telephone Co., up to the time of its sale to the Bell company last spring.

Mr. Draper also invented several instruments, among which was an electric fire alarm system for giving alarm on steam whistles. The system was installed in Mandan over 33 years ago, and is still in operation and said to be giving good service.

T. H. HILLARY, local manager of the Northwestern Telephone Exchange Co., at Hopkins, Minn., has been granted a leave of absence and his place will be taken by D. E. Bates.

JOS. SCHROEDER, manager of the Northwestern Telephone Exchange Co., at St. Cloud, Minn., has resigned. He is succeeded by W. H. Howland, of Minneapolis, who will have charge of both the St. Cloud and Foley offices.

J. W. MCKINSTRY, of Fargo, has been secured as manager of the Lake Park Telephone Co., Lake Park, Minn.

OBITUARY.

EDGAR JUDSON MOCK, president of the Electricity Magazine Corporation, publisher of Telephone Engineer, Electric Vehicles and Motography, died December 18, at his home in Chicago, after an illness of several months.

Mr. Mock was born March 26, 1870, at Fort Wayne, Ind. In 1896 he was publisher of the Alma, (Neb.) Weekly Record, which he gave up to start the Hastings (Neb.) Daily Record, which he published for two years. In 1898 he became superintendent of the Western Newspaper Union at Omaha, and there he married Miss Estelle R. Long.

In 1902 Mr. Mock became business manager of the Telephony Publishing Co., resigning five years later as secretary-treasurer. He then purchased Sound Waves, a telephone trade paper and sold it later to the McGraw Publishing Co., of New York.

The Electricity Magazine Corporation was organized by Mr. Mock in 1908. He was its president and treasurer for eight years, building up an organization which, though it feels his loss keenly, will carry on its work without any change, as was his desire.

The Late E. J. Mock.

Mr. Mock's wife, a sister and two brothers survive him. He was a member of the Illinois Athletic Club, Midlothian Country Club and Normal Park Lodge, 797, A. F. & A. M.

From Factory and Salesroom

Conventions: Nebraska, Lincoln, Jan. 10-12; South Dakota, Aberdeen, Jan. 16, 17 and 18; Minnesota, St. Paul, Jan. 23-25; Wisconsin, Madison, Feb. 6-8; Oklahoma, Oklahoma City, Feb. 19-20; Texas, Dallas, Feb. 22-23; Iowa, Des Moines, March 13-15.

Automatic for Fourth Exchange of Wisconsin Company.

The Glidden Telephone Co., which operates exchanges in Park Falls, (its headquarters) Glidden, Butternut, and Fifield, Wis., has just contracted with Automatic Electric Co., of Chicago, for the equipping of its main exchange at Park Falls, with a 400-line full automatic system.

This is the fourth automatic exchange to be installed by this company within the past 15 months, and when cut in service, the entire system will be operating mechanically.

Somewhat more than a year ago, the Glidden company was faced by the necessity of giving its patrons in Fifield, a small town some 5½ miles from Park Falls, continuous 24-hour service. The cost for operators to do this manually would have been practically prohibitive, but by installing a 50-line automatic switching unit at this point, the problem was very satisfactorily solved.

So well did this plan work out that during the past year the manual exchanges at Glidden and Butternut were each equipped with 100-line units. Each of these exchanges have trunks leading to Park Falls, and by dialing designated numbers, the subscribers in the outlying exchanges reach the toll operator at that point, who handles all information and long distance calls. Only occasional attention is given these boards by the switchmen who visit them, perhaps one every week or so.

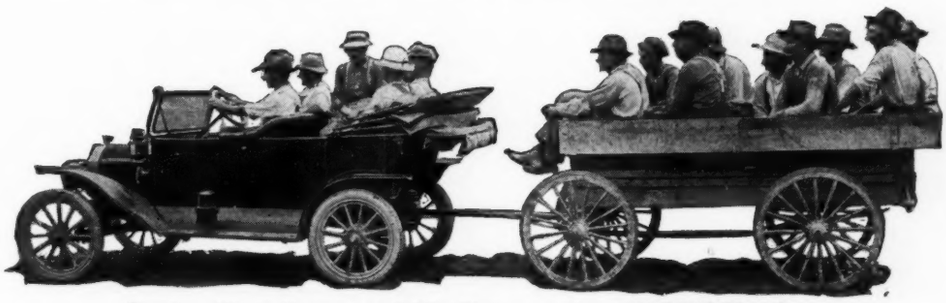
The automatic service given by these exchanges have proved very popular from the first, while the economy of operation and general efficiency of the equipment decided the company's officials to standardize their entire system along automatic lines.

Testing the Length of Life of Kellogg Plugs and Jacks.

Of course every telephone man knows that a plug or a jack will wear in time, so it isn't to establish that fact that the little machine shown in the accompanying illustration is used. But every man doesn't know or stop to realize the great variety of materials, or the endless number of shapes and sizes in which such plugs and jacks could be made. And if he did, how could he tell which kind or shape would wear the longest and give the best results?

When someone advances a new idea with regard to a jack or plug—it isn't

Cut Your 1917 Hauling Bill in Half



Saving Two Extra 20-Mile Trips with a MIAMI Trailer

A Miami Trailer Will Do It

Those who saw the Miami Trailer on display at the Chicago Convention saw the solution of their hauling problem at once. The trailer will not only save you the cost of operation and upkeep of an extra automobile, but it will save you a lot of workmen's time—the time you have to pay for.

Miami Trailers are designed and built for automobile speed—equipped with Timken axles and roller bearings, artillery wheels, oil tempered springs and special shock absorbing drawbar. Trailer tracks perfectly, the special drawbar eliminates jerking, so that both car and trailer ride easily on rough roads. They will outlast your machine.

Submit your hauling proposition to us.
If we can't save you money we'll say so.

THE MIAMI TRAILER CO., Troy, Miami County, Ohio

Trouble Detectives!

PIGNOLET Portable Testing Meters will locate any kind of trouble besides measuring volts and amperes; will also determine resistance of coils, lines, ringers, etc.

VOLTMETERS
AMMETERS
VOLT-AMMETERS

Suppose you let us send you a copy of the PIGNOLET Catalogue. It's worth while.

L. M. PIGNOLET
80 Cortlandt Street New York
Medal Panama-Pacific International Exposition

OSHKOSH TOOLS
are made for those who want "something better"

They represent the very best in both materials and workmanship. They are made to give long and satisfactory service.

"Ask the men who use them."

Get acquainted with the Oshkosh line.

Ask your dealer for them or write today for our catalogue.

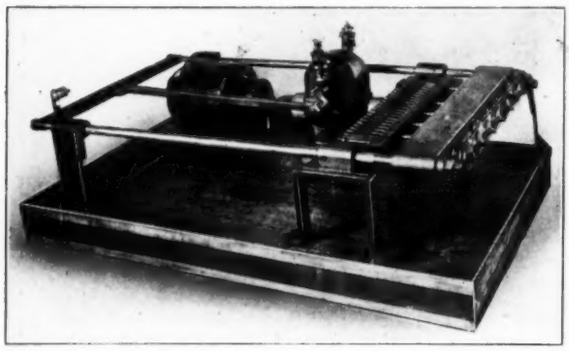
OSHKOSH MFG. COMPANY
Oshkosh Wisconsin

frowned upon in the Kellogg factory, but one or more are made and then comes the part of this little machine.

A strip of jacks is clamped in place and plugs are inserted in the movable block facing them. The switch is thrown and the test is on.

In and out the plugs are forced, ceaselessly lifting the springs and wearing on the sleeves.

With each operation the plugs are given about an eighth turn to make them wear evenly, as they would in service, and also the little counter on the left keeps a record of the number of thrusts.



Machine for Testing Kellogg Plugs and Jacks.

From time to time micrometer measurements are made and compared with the results of other types.

It isn't such a wonderful thing in itself, but it is a part of the system that the Kellogg Switchboard & Supply Co. has in operation by which it guards its reputation as producers of the "Best" and also guarantee its purchaser the maximum life and service in every article which bears its name.

Position Occupied by Kellogg Company in Independent Field.

"Surprising as it may seem, many people do not know that the Kellogg Switchboard & Supply Co. is, and for some time has been handling a very large supply business," said A. J. Carter, general sales manager, recently to a group of telephone men who had brought up the question of line construction materials.

"Our company is probably the largest exclusive telephone supply house in the field, and has, undoubtedly, the largest business in this phase of telephone work. This is true because of the Kellogg company's unequaled facilities in the matter of buying and the expert handling of orders and prompt shipments.

"Our practical telephone men see to it that our customers get only the best grade of supplies, and the quickest way to prove the fallacy of 'all supply materials being alike in quality' is to put an inexperienced man on the job. There is a great deal of difference, for instance, in various kinds of galvanizing, likewise in the different kinds of wood pins, their manner of cutting and subsequent handling.

"It is not just a question of prompt shipments, for in the matter of speed the Kellogg company has perhaps unequaled experience and facility, but the telephone man who, because of urgent line construction, or sudden storm, wants line construction material at his station at the very earliest moment possible, knows that 'Kellogg, if anybody,' can get it there.

"W. R. Brewer, who has charge of the supply department, makes it his particular business to follow up all orders, and when the very occasional error or delay happens, to have the case thoroughly investigated that the handling of the immense number of supply orders that come to the Kellogg company every day will be continually improved and cared for in absolutely the most efficient manner."

Cut-Over to New Common Battery Plant at Cleveland, Ohio.

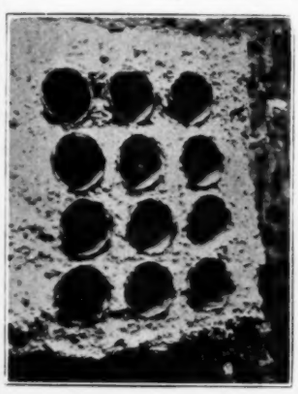
The new common battery plant of the Cleveland (Ohio) Telephone Co. was recently put into service. The plant has been installed in the company's new building, which was recently completed at a cost of over $10,000.

ROEBLING TELEPHONE WIRE

is protected with the heaviest practical coat of spelter. It possesses the highest mechanical properties for each particular grade. E. B. B., B. B., and steel grades.

It's the economical line wire because of its efficiency.

JOHN A. ROEBLING'S SONS COMPANY
TRENTON, NEW JERSEY



Clean as a Whistle!

Illustration shows a cut through a 12-duct conduit run. Look at the interior of each duct—clean as a whistle! It's

ORANGEBURG FIBRE CONDUIT

Notice too, how *smooth* the inside walls are. That smoothness means *easy pulling*—no risk of dangerous abrasions of the cable covering.

Millions of feet in use—why?—*efficiency in service.* Quick deliveries, too. *Get data.* Book H.

The Fibre Conduit Co.
Orangeburg, N. Y.
New York Boston Chicago San Francisco

REBUILT BARGAINS

International 4-bar 1600 ohm bridging compacts	$ 5.60
Dean Electric Company 3-bar 1000 ohm bridging common battery type magneto wall sets	4.85
Vote-Berger 3-bar 1000 or 1600 ohm bridging common battery type magneto wall sets	4.70
Williams-Abbott 3-bar 1000 ohm bridging compacts	4.50
Kellogg No. 186 common battery (desk) straight line wood hotel sets	4.00
Kellogg No. 39 common battery desk sets complete with No. 75 straight line steel signal set	6.00
North Electric Company 3-bar 1000 ohm bridging compacts	4.75
Monarch No. 22 type 3-bar 1000 ohm bridging desk sets	6.30
Monarch No. 22 type 4-bar 1600 ohm bridging desk sets	7.25
Dean Electric Company No. 2315 direct current common battery Bull neck desk sets, straight line, $5.00; Harmonic with either 16-33-50 or 66 style ringer	5.75
Stromberg-Carlson No. 681 type common battery desk sets complete with 659 steel signal set, straight line, $5.00; Harmonic with either 33-50 or cycle ringer	5.50
Baird 4-bar Midget type compact cabinets	.65
New hand generator cabinets, 3-4 or 5 bar size	.35
Stromberg-Carlson No. 14A common battery induction coils	.30
Kellogg golden finish, 100-line capacity magneto switchboard fully equipped with 90 No. 2-A 100 ohm series and 10 No. 3-C 1000 ohm bridging self-restoring combined line drops and jacks, and the following operators' equipment: 10 pairs of plugs and cords, 10 listening and double ringer keys, 10 single supervision ring off drops, power and hand generator switch key, hand generator, operator's suspended type transmitter head band receiver and complete night equipment; also 13 feet of full capacity line cable from base of board	170.00

For complete list of Standard Apparatus refer to our Rebuilt Bargain Bulletin No. 6 (free on request). Stock received since Bulletin published shown in our Telephony ads.

REBUILT TELEPHONE EQUIPMENT CO.
2127-2129 W. 21st St. - Chicago, Ill.

Please tell the Advertiser you saw his Advertisement in TELEPHONY.